UNIVERSITY OF BIRMINGHAM

THE CHALLENGE OF CONDUCTING A WATERBIRTH RANDOMISED CONTROLLED TRIAL

by

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A thesis submitted to the

University of Birmingham

For the degree of

DOCTOR OF PHILOSOPHY

School of Health and Population Sciences
(Nursing and Physiotherapy)
University of Birmingham
September 2011

ABSTRACT

Waterbirths have been available in the United Kingdom as a method of pain relief for childbirth for over two decades but the neonatal safety of birth in water remains unevaluated. Opponents of a waterbirth randomised controlled trial state randomisation would undermine women's childbirth experience. In addition, little is known about midwives' attitudes to waterbirths. This thesis addresses some of the lack of evidence by reporting the findings of two studies which had three aims: to investigate the feasibility of a waterbirth RCT to assess the effects of a waterbirth on the neonate, to explore women's thoughts about participation and whether randomisation affects women's satisfaction with their childbirth experience and to assess midwives' attitudes to waterbirths.

The first study involved a RCT with a 'preference arm'. Eighty women were recruited: 60 in the RCT and 20 in the 'preference arm'. Women were asked to complete questionnaires to assess their expectations for, and satisfaction with, their childbirth experience: at recruitment, after the birth and 6 weeks after the birth. Women in the randomised arm indicated willingness to partake but questioned midwives' commitment to offering waterbirths.

A Q Methodology study was undertaken to identify factors which influence midwives' (*n*=31) attitudes towards waterbirths. Four factors were identified: Motivation, Risk Assessment, Confidence, Safety.

Conclusion: It is feasible to organise a larger RCT to assess neonatal safety and women would be supportive. Strategies would be required to ensure midwives are confident and supportive of the waterbirth service.

DEDICATION

This thesis is dedicated to my mother who was very anxious at the thought of babies being born in water. Unfortunately, she was unable to see the completion of this thesis.

And to my husband, son and daughter for the support they have given me over the years.

ACKNOWLEDGEMENTS

My supervisors at the University of Birmingham for all their guidance, support and encouragement: Dr S.M. Kelly, Professor C.M. Clifford and Professor C.M. Hicks.

Dr D. P. Farrell for the advice and help he gave me with the Q Methodology study.

The women who agreed to participate in the waterbirth study.

My employers at Northampton General Hospital NHS Trust who agreed to host the waterbirth study and awarded me a 'Getting Started in Research' award.

My midwifery colleagues who supported the waterbirth study by informing women about the research and collecting the data.

The midwives who agreed to participate in the Q Methodology study.

Ros Weatherall, NHS/CR-UK Centre for Statisitics in Medicine, Oxford University for the statistical advice provided for the waterbirth RCT and the power calculations for a future study.

Professor J.M. Green, Leeds University, for permission to use a selection of the questions from the Great Expectations Survey for the waterbirth study questionnaires.

The National Perinatal Epidemiology Unit, Oxford University, for the waterbirth study randomisation schedule.

The Royal College of Midwives for awarding me a HSA Charitable Trust Scholarship which helped towards the cost of my degree.

Andrew Woodward, my husband, for diligently proof-reading this document.

Table of Contents

Table of Figures

Table of Tables

ABBREVIATIONS

AIMS	Association for Improvement in the Maternity Services
AJOG	American Journal of Obstetrics & Gynecology
ARM	Artificial rupture of membranes
ARM	Association of Radical Midwives
B	Beta
BJOG	British Journal of Obstetrics and Gynaecology
C	Celsius
CASP	Critical Appraisal Skills Programme
CI	Confidence Interval
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CONSORT	Consolidated Standards of Reporting Trials
CQC	Care Quality Commission
CRN	Clinical Research Network
DARE	Database of Abstracts of Reviews of Effects
DH	Department of Health
DHSS	Department of Health and Social Security
e.g.	exempli gratia (for example)
et al	And others
GBS	Group B Streptococcus
GMC	General Medical Council
GP(s)	General Practitioner(s)
HCC	Healthcare Commission
HDU	High Dependency Unit
HM	Her Majesty's
HMSO	Her Majesty's Stationery Office
HOM(s)	Head(s) of Midwifery
HTA	Health Technology Assessment
HVS	High Vaginal Swab
i.e.	That is
IOL	Induction of labour
JOGNN	Journal of obstetric, gynecologic and neonatal nursing
Kpa	Kilopascal
LSCS	Lower Segment Caesarean Section
MDU	Midwife Development Unit
MeSH	Medical Subject Headings
MIDIRS	Midwives Information and Resource Service
MLU	Midwife-led Unit
mmHG	Millimetres of mercury
MRC	Medical Research Council
MSLC	Maternity Service Liaison Committee
n	number
NCCWCH	National Collaborating Centre for Women's and Children's Health
NCT	National Childbirth Trust
NETSCC	The NIHR Evaluation, Trials and Studies Co-ordinating Centre
NGHT	Northampton General Hospital NHS Trust

NHS	National Health Service
NHSE	National Health Service Executive
NHSFT	National Health Service Foundation Trust
NHSLA	National Health Service Litigation Authority
NHST	National Health Service Trust
NICE	National Institute for Health and Clinical Excellence
NICU	Neonatal Intensive Care Unit
NIHR	National Institute for Health Research
NMC	Nursing and Midwifery Council
No.	Number
NRES	National Research Ethics Service
NS	not significant
NSF	National Service Framework
OR	Odds ratio
p	probability
PA	'Preference Arm'
$PaCO_2$	Partial pressure of carbon dioxide
PaO_2	Partial pressure of oxygen
RCM	Royal College of Midwives
RCOG	Royal College of Obstetricians & Gynaecologists
RCT	Randomised Controlled Trial
R & D	Research and Development
SD	Standard Deviation
SoM	Supervisor of Midwives
Sp/spp	Species
SPSS	Statistical Package for Social Scientists
TENS	Transcutaneous electrical nerve stimulation
UK	United Kingdom
UKCC	United Kingdom Council for Nursing and Midwifery
VBAC	Vaginal birth after Caesarean section
Vs	Version
@	At
%	Percentage
&	And
X^2	Chi squared test
^{0}	Degree
<	Less than
>	Greater than
≤	Equal to or less than
≥	Equal to or greater than

CHAPTER 1: INTRODUCTION

1.1. Introduction

The first known European waterbirth occurred in France during 1803 when a woman having a long labour entered a bath of warm water and gave birth soon after while still immersed in water (Balaskas, 2004). In other parts of the world women give birth in rivers or the sea: Russia, Guyana and South America (Balaskas, 2004). Since the early 1980s women in the United Kingdom (UK) have been asking to use immersion in warm water during childbirth to help cope with their contractions. In 1992 the The House of Commons Health Committee (1992) recommended that hospitals, 'where practicable', have a birthing pool for women to use during labour for pain relief. However, the introduction of a waterbirth service in maternity units without robust, scientific evidence has led to its being likened to 'a naked emperor' with proponents extolling the virtues of waterbirths while disregarding the concerns (Schroeter, 2004).

In the last five years there have been two National Health Service (NHS) maternity surveys asking women about their childbirth experiences, which indicate that the percentage of women achieving a waterbirth has remained static at 4% (Redshaw et al., 2007, p. 25; Redshaw & Heikkila, 2010, p. 35). This finding may be linked to the fact that some midwives do not promote birth in water (Woodward & Kelly, 2004).

The focus of this thesis is to examine the controversal topic of conducting a randomised controlled trial (RCT) to address the lack of research-based evidence currently available about waterbirths, especially the effects on the neonate. Twenty years have passed since the suggestion was first made that maternity units should provide facilities for maternal water immersion in labour (DH, 1992) and other documents have been published which have also supported the use of a birthing pool (Shribman, 2007; NCCWCH, 2007; RCM/RCOG, 2006) but the safety of a waterbirth for the neonate remains unevaluated.

The thesis reports the results of two studies and is organised in two parts. The purpose of Part 1 is to report the main study which investigates the feasibility of conducting a RCT to assess the effect on the neonate of maternal immersion in warm water during childbirth. As part of the RCT women were asked to complete questionnaires to assess the impact of randomisation on their childbirth experience. The women reported that some midwives did not appear to support their decision to have a waterbirth. Therefore, Part 2 reports a secondary study, a Q Methodology study, which investigates midwives' attitudes to waterbirths because this is an area about which little is known and may impact on the success of a future RCT.

1.2. Background to the Thesis

In the 21st century there is an aspiration for the NHS to provide a high quality, safe service which meets the needs of users (DH, 2010). The Government states that the service must also become more accountable by involving users in designing improved, patient-focused, sustainable services while working within the economic constraints of current financial budgets (DH, 2010). The NHS Constitution (DH, 2010a; DH, 2009) has been published which clearly sets out the responsibilities of the NHS by reiterating the demand not only for high quality services but also the requirement for patients and their families to be treated with respect, dignity and compassion. At the time of writing this thesis, the Government is trying to modernise the NHS further by promoting a service in which the commissioning of services is undertaken by healthcare professionals to match the health needs of patients (DH, 2011). The aim is to create a first class service with improved performance yet at the same time achieve efficiency savings to ensure sustainability (DH, 2011). Controversially, in order to provide competition, which is thought to help improve performance and efficiency, the Health and Social Care Bill (DH, 2011) also proposes that private healthcare providers should work in collaboration with the NHS and be able to provide some of the services which patients require.

The ageing and increasingly diverse population of the United Kingdom (UK) poses the NHS additional challenges when designing care and also provides

challenges for financial budgets. The Government's policies which promote a patient-focused service have increased patients' expectations. Patients demand the latest expensive drugs and technologies to treat their long-term health conditions. In 1999, The National Institute for Health and Clinical Excellence (NICE) was set up to promote clinical excellence and to ensure that the NHS provided cost-effective and appropriate treatments. Clinical incidents and adverse events which affected patients' care and outcomes resulted in the publication of damning reports such as The Shipman Inquiry (HM Government, 2005) and the investigation into care at Northwick Park Maternity Unit (HCC, 2006). These events meant that clinical governance and safety of patients became a priority and regulatory authorities such as the Care Quality Commission (CQC) have been set up to monitor NHS performance standards (CQC, 2010). The CQC has made a commitment to focus on maternity services to bring about improvements (CQC, 2010) following an independent inquiry into the safety of maternity services (King's Fund, 2008) which made recommendations for significant reforms. Adverse events occurring in the NHS have led to an increasing number of clinical negligence claims being handled by the NHS Litigation Authority with a large proportion of payouts involving maternity cases (NHSLA, 2010). This has been one of the drivers for increased consumer input when designing and planning services and for women to be involved in decision-making about their maternity care.

Maternity services are also directly affected by Government changes in the NHS. In fact it could be said that they have led the way by working towards a woman-

led service since 1993 (DH, 1993). In the 20th century maternity services underwent many organisational changes with the drive for women to give birth in hospital rather than at home as it was deemed at the time to be safer for the mother and her baby for childbirth to take place where emergency facilities and medical care were available should they be needed (DHSS, 1970). However, one consequence of the hospitalisation of childbirth was that the rate of normal birth decreased and the intervention rate in childbirth increased dramatically (BirthChoiceUK, 2010).

In the last twenty years, in response to concerns about medicalised maternity care, there have been many national reports, recommending changes in the delivery of NHS maternity services (DH, 1993; DH, 1997; NHSE, 1999; DH, 2004; DH, 2007). In 1993, the Government published the ground breaking Changing Childbirth Report (DH, 1993) as a response to complaints from women and organisations such as the National Childbirth Trust. One aim was to reduce the patriarchal power of the medical profession over childbirth which had reduced the status and influence of the midwifery profession (Mander & Reid, 2002, p. 15). The report also stated that the medical model of childbirth was not appropriate for the majority of women and advocated more control and choice for women over the maternity care they receive. Another objective was to use midwives' skills appropriately and hopefully improve midwifery job satisfaction, to enable obstetricians to concentrate on women who have complications during pregnancy and also to improve the experience of women using the maternity services. The report (DH, 1993) emphasised that women should have consistent, appropriate

advice and have a named individual who they would get to know and build a relationship with. However, these changes have had little impact on the the normal birth rate in the UK which has fallen dramatically from 60% in 1990 to less than 50% in 2006 (BirthchoiceUk, 2010). This indicates that obstetricians are now involved with the majority of women having NHS maternity care. Since 1993 there have been other reports which recommend that midwives should have a more active role in decisions affecting both maternity service provision and the care women receive: The NHS Plan (DH, 2000), Midwifery: delivering the future (DH, 1998), the National Service Framework (NSF) for Children Young People and Maternity Services: Standard 11 (DH, 2004) and Maternity Matters: choice, access and continuity of care in a safe service (DH, 2007).

Consumer organisations continue to voice concerns about the level of medical intervention in childbirth, and in particular the high rates of Caesarean section deliveries. By collaborating with researchers and health professionals, the NCT obtained evidence that women's opportunities for a normal birth were diminishing and were able to highlight policies and birth environment changes which would either support or hinder women-led maternity services and normal childbirth (NCT, 2004; Green et al., 1998a; Audit Commission, 1997). In response, the publication of the NSF (DH, 2004) built on the aims of Changing Childbirth (DH, 1993) and reaffirmed the Government's commitment to 'promote the normality of childbirth', by providing national quality standards. Examples included: being able to enjoy relaxed birthing environments, the choice of a home birth or birth in a midwife-led unit, one-to-one care from a midwife when in labour and support to

help women breastfeed. In addition, the NSF (DH, 2004) recognised that there were vulnerable women, with poor social circumstances, who were not accessing the care they required and as a consequence had poor outcomes. The NSF (DH, 2004) highlighted the need for inclusive services to meet the needs of all women and their families.

In 2007 Maternity Matters (DH, 2007), was published which set out targets to improve the quality and safety of care and ensure the service is appropriate for the 21st century by firmly placing women at the centre of maternity service provision. Many of the policies and aims in Maternity Matters (DH, 2007) were the same as those promoted in Changing Childbirth (DH, 1993). The aims continued to be for women to have more choice regarding how to access maternity care, the type of antenatal care they receive, depending on their circumstances, a choice over the place of birth and a choice of where and how to access postnatal care (DH, 2007). In order to achieve a woman-centred service, it recommended a shift towards midwives' providing much of a woman's care in the community through working in Children's Centres rather than hospital (DH, 2007).

National Surveys undertaken recently to obtain women's views about maternity services have demonstrated that some women are still unable to exercise choices to obtain the birth experience they would like, are not supported by a midwife they know and respect, and are often left alone in labour feeling

frightened (Redshaw et al., 2007; Redshaw & Heikkila, 2010). However, the national policies (DH, 2007; DH, 2004; DH, 1993) and their objectives have impacted on midwives working for the NHS by driving changes to clinical practice, interprofessional relationships and working conditions. Some of these issues and midwives' responses are explained further in Chapter 5. Moreover, there is evidence that the status of midwives has not been improved (Mander & Reid, 2002) and that midwives working in the NHS are experiencing horizontal bullying and increased stress levels (Ball et al, 2002). Kirkham (1999) has written about the culture of NHS midwifery with its lack of inspirational leadership, lack of mutual support and midwives feeling the need to conform in order to prevent repercussions from peers. Deery (2005) found that the bureaucratic process of working in a large maternity unit exaggerated stress levels further as midwives perceived that the system was thought to be more important than the midwives. Deery (2005) also noted that the constant ongoing organisational changes and increased demands placed on midwives by their managers were detrimental to working relationships with both peers and women. Resistance to change was noted to be the key defence mechanisms used by midwives. It has also been claimed that the resistance is even greater if the changes, which are advocated, are of benefit to users of the service rather than midwives (Thomas, 2002, p. 31). In addition, it was thought that the cultural legacy of NHS midwifery may inhibit autonomous practice because obstetricians are regarded as having greater power in maternity service decisions (Thomas, 2002). Since Changing Childbirth there have been debates about the importance placed on continuity of care in relation to the ability of midwives to provide it (Pankhurst, 1997). It has been

identified that midwives have left the profession because they have been unable to achieve continuity and as a consequence become disillusioned with their role (Ball et al., 2002; Sandall, 1998).

There has also been a desire for women to be consulted and have greater involvement with the organisation and provision of maternity services in order to drive changes and ensure a woman-led service (DH, 2007; DH, 2004; DH, 1993). However, there is evidence that women's preferences are affected by the availability of services which they know about, or have previously used, in their area (Hundley and Ryan, 2004). It has been claimed that women are more likely to choose aspects of care which are currently available for them, preferring to maintain the status quo rather than risk the fear of the unknown or the disruptive effect of service re-organisation (Hundley & Ryan, 2004). Therefore, women's expectations may be limited and actually hinder service development if they are consulted.

In recent years, there have been other pressures on maternity services which have lead to a disparity between Government rhetoric about women having choice and the reality of day to day maternity units. In England the number of annual births has increased by 22% over 10 years yet the number of midwives has not increased correspondingly and, furthermore, many practising midwives are nearing retirement age (RCM, 2011). The RCM (2011) states that 5,000 more midwives are required to provide the type of care promised by the

Government. Many of the women who give birth have complex needs because of their age and/or medical or social problems. The implementation of the European Working Time Directive (HMSO, 1998) causes problems when a service needs to be staffed for 24 hours and workloads cannot be predicted. In addition, the Directive (HMSO, 1998) significantly affects maternity services because there can be no cross-over of staff from other medical speciality staff when workloads become too great (DH, 2007). This has led to closure of smaller obstetric maternity units and/or amalgamation of units and the need for midwives to be trained to undertake duties which were once done by doctors and the encouragement to offer midwife-led care to low-risk women. This causes protests from women who complain that such measures militate against the ethos of the modern NHS which promotes patient-led services and choice of birth environment (Shribman, 2007). However, some of these changes are driven by risk and maternal and neonatal safety (Shribman, 2007).

Midwives are acknowledged to be the experts in normal childbirth (Midwifery 2020, 2010). There is the recognition that 'all women require a midwife' and that only women who have complex needs will need to see an obstetrician to advise and plan maternity care (Shribman, 2007). Therefore, most women who have a straightforward pregnancy and labour do not require the more expensive obstetric expertise. Currently, there are further proposals published in a Department of Health White Paper (DH, 2010b) for women's choice to be widened further by the creation of maternity networks, which were first proposed in the NSF (DH, 2004) with the service focusing on the individual with professionals collaborating to

commission and provide an excellent, equitable, clinically effective service. There are on-going discussions as to how the networks will be organised but the suggestion is that women with complex needs will book at a large tertiary midwifery unit which has neonatal intensive care facilities (RCOG, 2010). Other women will have the choice of a home birth, birth in a midwife-led unit or a smaller obstetric unit (RCM, 2010; NCT, 2010) or even the chance to receive care from case-loading midwifery practices which complement NHS maternity services (ARM, 2010).

This White Paper (DH, 2010b) also demonstrates the Government's commitment to the promotion and conduct of research as a core role of the NHS to enable the service to deliver excellent care and become a world-class service (DH, 2010; DH, 2009; DH, 2010a). The National Institute for Health Research (NIHR, 2011) provides training to practitioners to ensure good clinical research practice. To guide researchers evaluating complex interventions by using a RCT, the Medical Research Council (MRC, 2008; MRC, 2000) has provided a framework to promote good quality research and to aid researchers in choosing appropriate methods. The guidance, which was published just before recruitment to the waterbirth study commenced, highlights the usefulness and importance of qualitative methods when doing exploratory work prior to any evaluation. However, in this thesis the qualitative elements were undertaken after the initial quantitative waterbirth study. The mixed methods evolved, because after completing the waterbirth study, the researcher was informed by her supervisors that the criteria for a research degree had been revised and the waterbirth study

work no longer met the new, stricter standards. Therefore, in order to comply with the new requirements, further research had to be carried out. As a number of women who participated in the waterbirth study questioned whether midwives supported waterbirths, the decision was made to carry out a sequential qualitative study which explored this issue. The MRC guidance (MRC, 2008) also provides the foundations for a proposed study design process and would be useful for aiding researchers in the development of waterbirth RCT by explaining five stages: Theory, Modelling, Exploratory Trial, Definitive RCT, Long-term Implementation. This thesis exploring the feasibility of a waterbirth RCT reports the first three stages. The first stage (Theory) is to explore the current evidence in order to ensure the best choice of intervention and define the hypothesis (MRC, 2008). Currently, there is little evidence about the effect of a waterbirth on the neonate which is discussed in Chapter 2 of this thesis. The second stage (Modelling) is concerned with identifying the components of the intervention (MRC, 2008): data collection and analysis. The third stage advocates that exploratory work, such as a feasibility study or pilot study, should be undertaken to assess problems which may occur before the substantial trial is attempted which in this thesis is reported in Chapters 3 and 4.

The Department of Health has stated that the NHS must make all patients aware of research 'that is of particular relevance to them' (DH, 2010a) to encourage greater participation in research. One area which has not been evaluated by research but which some women choose as a way to help them cope with contractions during childbirth is the use of a birthing pool. One of the pioneers of

waterbirths was the French obstetrician Michel Odent. In the 1970s he realised that women in labour were attracted to water and bought an inflatable pool for his unit and found that the pharmacy costs were reduced dramatically (Odent, 2000). However, it was not until 1987 that the first birthing pool was installed in a NHS hospital (Kitzinger, 2000). This was in response to the demand by women for a less medicalised childbirth and the desire for the opportunity to achieve a sense of satisfaction and fulfilment by having a natural, physiological childbirth (Morrin, 1997). Midwives working in midwife-led units also encourage women to use water for pain relief as they perceive there are fewer risks for the neonate compared with pharmacological pain relief (Nicoll et al., 2005; Baxter, 2006). In order to support women make their choices for their childbirth experience this thesis explores whether a waterbirth RCT can be organised to provide robust information about the condition of a neonate following a waterbirth compared with a land birth.

1.3. Women's Views of Waterbirths

Women who use a birthing pool express positive views and achieve a high level of satisfaction with their birthing experience (Richmond, 2003; Ockenden, 2001; Hall & Holloway, 1998) and even those who were not so happy with the experience thought it was more helpful rather than less helpful (Burns, 2001). Women report feeling in control of their labour (Richmond, 2003; Brown, 1998). Women who have had a previous disappointing childbirth experience often express a desire for a different birth environment, such as immersion in water, for

a subsequent birth (Jenkins, 2005) even if it means going against professional advice (Ockwell-Smith, 2006). Many are determined to try a birthing pool in order to maintain control during the subsequent labour and afterwards provide written reports about their 'amazing experience' (Otero, 2006), and even a midwife described her use of a birthing pool for childbirth as a complete contrast with her other traumatic birthing experiences (Pidgeon, 2003). However, some women write about the hurdles they have had to overcome in order to achieve their aim (Howell, 2005). Examples provided by Howell (2005) are: community midwives who are not trained or experienced to support waterbirths, women only allowed to labour in the pool and who had to get out for the birth, and midwives who belittled their hopes for a pain-free labour.

1.4. Benefits of Waterbirth for the Mother

The anecdotal benefits of immersion in warm water for pain relief in the first stage of labour are well documented by professionals (Benfield et al. 2001; Cammu et al. 1994; Church, 1989; Brown, 1982; Odent, 1981) and there is evidence from audit that women require less pharmacological pain relief (Garland & Jones, 2000; Burns & Greenish, 1993). Odent (1983) believes from his observations that warm water relaxes women in labour and reduces levels of catecholamines. Raised levels of catecholamines have been associated with psychological stress and in labour this may have the effect of lower uterine activity and longer duration of labour (Lederman et al., 1978). Catecholamines also inhibit endogenous

endorphin production. Endorphins act on opiate receptors to promote analgesia (Gordon, 1991). Women themselves report that immersion in water during labour is a positive experience (Hall & Holloway, 1998). A woman immersed in water is also more mobile, able to change position easily and is more in control of her labour (Richmond, 2003; Chapman, 1994).

1.5. Anecdotal Benefits for the Neonate

There is anecdotal evidence that babies born in water appear calmer (Burns & Greenish, 1993); whether this is due to the environment or because mothers have less narcotic analgesia is unclear and more research has been called for to explain the finding (Chapman, 1994). Smirnov (2002) states that because the baby is born from amniotic fluid into water there is a gentle transition into the world and that the baby does not cry because it receives no stimulus to arouse its 'negative aggressive tendencies'. It has also been found that during the first few months of life, the psychosomatic development for waterbirth babies was ahead of that of non-waterbirth babies (Smirnov, 2002). The proviso has to be made that Smirnov provided no details about the number of babies involved in the assessments. However, there is controversy and anxiety surrounding the impact of a waterbirth on the neonate (Aird et al., 1997).

1.6. Birth in Water and Concerns for the Neonate

There have been several concerns raised about effects of a waterbirth on the neonate following the deaths of babies following a waterbirth or maternal immersion in warm water during labour (Beech, 1997; Rosser, 1994; Rosevear et al., 1993). These concerns will now be discussed.

1.6.1 Waterbirth and Fetal-Maternal Thermoregulation

The neonatal deaths were thought to be caused by disruption to the fetal maternal thermoregulation (Rosevear et al., 1993; Deans & Steer, 1995; Johnson, 1996). The fetus is totally dependent on the mother for thermoregulation (Power et al., 2004 p. 542). Heat produced in the uterus must flow to the maternal body to be dissipated and for this physiological process to occur a fetal-maternal temperature differential of 0.5^0C is required (Macauley et al., 1992). The concern is that if the temperature differential narrows, because of maternal pyrexia, heat loss from the fetus will slow or reverse. Following the deaths of two babies in Bristol it was speculated that a rise in maternal temperature, while in the pool, may have contributed to the deaths by reducing the fetal-maternal temperature differential (Rosevear et al., 1993). This also results in a reduction in fetal-maternal oxygen transfer (Power et al., 2004 p. 542) and as a consequence the oxygen needs of the fetus are not met (Charles,

1998). If this process is not halted, death may occur due to hypoxia and/or overheating of the fetal brain (Power et al., 2004 p. 543). Pinette et al. (2004) reported an incidence of hypoxic ischaemic encephalopathy of the newborn which was thought to have occurred because of disruption to the fetal-maternal thermoregulatory system. These cases have caused alarm because women who use the pool would normally be at low-risk of childbirth complications. Therefore, one important consideration is the water temperature during maternal immersion. Although there are guidelines (Burns & Kitzinger, 2005) to aid midwives regarding temperature of the pool water, these are based on professional opinion only without research evidence to back them (Anderson, 2004) so further investigation is required.

1.6.2. Waterbirth and Risk of Water Aspiration

Healthcare professionals have reported, by letter or individual case study, other anxieties about waterbirth adverse events which have occurred to babies. One concern is the risk of water aspiration (Mammas & Thiagarajan, 2009; Kassim et al., 2005; Nguyen et al., 2002; Rosser, 1994). There are several factors which are thought to prevent a baby from inhaling water at birth. Firstly, it is claimed that when a baby is born in water, the diving reflex is usually initiated (Harned et al., 1970). The diving reflex is apnoea in the expiratory position with closure of the larynx (Eldering & Selke, 1996, p. 20). The diving reflex will be inactivated by severe asphyxia (Eldering & Selke, 1996, p. 23) and the neonate may gasp immediately at birth while still under the water so inhaling water (Harper, 2000).

However, the presence of the diving reflex in newborns has been questioned (Walker, 1994). Secondly, it is accepted that the fetus practises breathing while in utero and that this is thought to be a good indicator of fetal health (Dawes, 1974). Approximately 48 hours before spontaneous labour the fetal breathing movements cease, which is due to biochemical changes within the maternal and fetal circulation (Johnson, 1996). Thirdly, acute hypoxia, which occurs in normal labour in utero, also inhibits breathing and causes swallowing, not gasping: however, if it is severe or prolonged, gasping will occur in a compromised neonate while still under the water and aspiration of water may occur (Johnson, 1996). Finally environmental temperature is a major determinant in initiating a baby's breathing at birth (Aird et al., 1997). Warmth, in the absence of prolonged or severe hypoxia in utero, is an inhibitory factor to breathing so if a baby is born in warm water at the same temperature as amniotic fluid following spontaneous labour, with no signs of fetal distress, and with the cord intact, it should be successfully inhibited from breathing (Johnson, 1996). However, Johnson (1996) stated that environmental cooling by 1 – 2^0C stimulates the fetal receptors in the upper airways and breathing movements ensue leading to water aspiration. Therefore, the underlying circumstances which may increase the risk of neonatal water aspiration need further clarification.

1.6.3. Waterbirth and Risk of Neonatal Infection

Infection caused by contaminated pool water from stagnant water remaining in pipes and water hoses or from water contaminated by maternal blood and faeces has been raised as an issue (George & Hobbs, 1990; Robb et al., 1991; Rawal et al. 1994). It is also thought that the warm temperature of the water may provide the ideal conditions for bacteria to multiply (Zanetti-Daellenbach et al. 2007) so increasing the chance of neonatal colonisation. Cases of neonatal meningitis (Vochem et al., 2001) and otitis media (Parker & Boles,1997) have been reported following culture of *Pseudomonas aeruginosa* from swabs which indicated the infection was caused by contaminated water. Therefore the risk of neonatal infection requires further investigation.

1.6.4. Waterbirth and Adverse Events Involving the Umbilical Cord

There have been reports of two adverse events involving the umbilical cord. Firstly, there have been reports of a possible increased incidence of a torn umbilical cord with a waterbirth (Rosenthal, 1991; de Graaf, 2000; Greenish, 2000). It is thought this may occur if the baby is brought to the surface too quickly, so putting tension on the cord (Ros, 2010). Secondly, there has been one report of severe polycythaemia in a neonate following a prolonged physiological third stage of labour in water (Austin et al. 1997). It was suggested that the

umbilical cord was immersed in the warm water, which was at body temperature, and the warmth had encouraged the cord to pulsate for longer than normal. This meant that more blood than usual was transferred to the baby. With a traditional land birth the cold air causes the umbilical cord to vasoconstrict which limits the blood flow to the infant which is thought to prevent polycythaemia (Austin et al. 1997). However, no other cases have been reported so the real risk is unknown but is possibly small.

1.7. The Need for Further Research

There is unresolved controversy surrounding the safety aspects for the neonate. It is not known how often these adverse events occur following a waterbirth and consequently many healthcare professionals state that immersion in warm water during labour and childbirth has been offered to women as a method of coping with contractions without evidence to back its use (Schroeter, 2004; Pinette et al., 2004; Aird et al., 1997; Walker, 1994). The report Changing Childbirth (DH, 1993) criticised healthcare professionals because many childbirth procedures had been introduced without the evidence to justify them so it was recommended that midwives base their professional care on research-based evidence in order to offer women greater information. This means that women would be empowered to make informed choices about their care. The recommendation has been reiterated by other documents (DH, 1998) and in the Midwives Rules and Standards (NMC, 2010, p. 20).

An additional driver for waterbirth research is the fact that gynaecology and obstetric clinical negligence payments have increased by 18% between 2009 and 2010 often involving high payouts for neonatal cerebral palsy claims (NHSLA, 2010) because of sub-standard care in labour (RCOG, 2010). Although only a small percentage of women have a waterbirth, the total numbers are increasing because of the higher number of births. The increasing number of babies being born in water means that there is a greater risk of neonatal adverse events which may lead to negligence claims. Therefore, this knowledge gap concerning the effects on the neonate of a waterbirth requires addressing.

1.8. Demands for a Waterbirth Randomised Controlled Trial

In addition to the recognition of the need for further research, a review of the literature in Chapter 2 confirms that there is a lack of robust research-based evidence surrounding the effects of maternal immersion for childbirth on the fetus and neonate. One Cochrane Systematic Review relating to waterbirths was identified (Cluett & Burns, 2009) which investigated the effect of water immersion at any stage during childbirth on fetal, neonatal, maternal and midwife outcomes. The review identified 11 RCTs which the authors judged suitable for inclusion. The trials looked at different time-frames of water immersion in childbirth. However, only one RCT investigated both the first and second stages of labour (Woodward & Kelly, 2004) which is reported in Chapter 3.

Many have called for a large adequately powered RCT to be undertaken to rectify this lack of robust information (Cluett & Burns, 2009; Aird et al., 1997; Alderdice et al., 1995; Walker, 1994). The RCT is regarded as the 'gold standard' of research methodologies as it reduces the chance of bias when comparing outcomes for two interventions by eliminating known and unknown confounding variables (Sim & Wright, 2000, p. 89).

1.9. Concerns Surrounding a Waterbirth Randomised Controlled Trial

Some healthcare professionals, however, have questioned whether such a trial is feasible (Garland and Jones, 1994; Jowitt, 2001). It has been questioned whether women would agree to participate in a RCT because women want to decide whether to use the pool themselves (Garland and Jones, 1994). Many of the reasons for the doubt surrounding the organisation of a waterbirth RCT are linked with the disadvantages of the methodology. For example, would women who consent to be randomised be representative of the usual waterbirth service users (Hicks, 1998; Peat, 2002) or do they have different aspirations for their childbirth experience? It is feared that women who participate may have different characteristics and outcomes compared with those who definitely desire a waterbirth and would therefore decline randomisation (Peat, 2002, p. 27). If so, results from a RCT may not be applicable to the normal pool users, or women who have control over their choice (Peat, 2002, p. 27). Others state that

randomisation is contrary to the ethos of providing alternative care such as a waterbirth service (Garland and Jones, 1994) and that there is too much reliance on RCTs to provide evidence (Meah et al., 1996). It has also been stated that the 'art of midwifery eludes quantification' but women should not be denied alternative methods of care, such as waterbirths, just because they have not, and cannot be examined in the traditional scientific way (Elder, 1989).

Jowitt (2001) claimed that a RCT would not be ethical because it would deny women the opportunity to choose whether or not to use the pool and as a consequence diminish their satisfaction with childbirth. If this were to be the case, it would contravene the Government desire for women to have more influence over the care provided to them by maternity services (DH, 1993).

Part 1 of this thesis addresses these questions and concerns by the reporting of a waterbirth RCT pilot study with a 'preference arm', The use of a 'preference arm' meant that women who agree to randomise can be compared with those who decline because they definitely want a waterbirth (Brewin and Bradley, 1989). This also meant that women's expectations for childbirth and their satisfaction could be investigated to see whether randomisation had an adverse impact on these outcomes. If the outcomes of the 'preference arm' group are similar to the RCT arm then one may predict that the trial results will apply to the general population (Fielding et al., 1999). Women in the RCT arm were also asked for their thoughts about participating in a research project and gave a favourable

response. However, five women reported that some midwives did not appear to support the provision of a waterbirth service (Woodward & Kelly, 2004).

1.10. Midwives and Waterbirths

In response to reports from women that some midwives did not appear to support waterbirths, a decision was made to investigate midwives' attitudes to waterbirths because this would be an important factor to take into account when organising a large RCT. A literature search in 2005, which was repeated in 2007, revealed no published studies which had investigated this topic but since conducting the search, two studies have been published. One in America where midwifery care is very different compared with the UK (Stark & Miller, 2009) and an action research study (Russell, 2011).

In order for a large RCT to be successful, it is important that the waterbirth service is thriving and midwives are confident and competent to support women having a waterbirth. There is one particular area where midwives can make a contribution to enhancing women's choice for pain relief in childbirth and which may also improve midwives' working lives. This is to make women aware of the waterbirth service and to offer the use of a birthing pool to low-risk women (House of Commons Select Health Committee, 1992).

The NSF (DH, 2004) stated that staff should be able to support women who wish to use non-pharmacological pain relief in labour, including water. In 2007, The National Institute for Health and Clinical Excellence (NICE) stated that water immersion should be available for suitable women during labour, but with the caveat that there is insufficient evidence concerning safety of birth under water (NCCWCH, 2007). However, in most obstetric maternity units only a small percentage of women actually achieve this method of care, with figures ranging from 3 – 5% (Garland, 2000). Midwife-led units and birth centres have higher rates because they are unable to offer epidurals and are reluctant to use pharmacological pain relief because they affect the neonate by causing respiratory depression at birth.

Midwife-led units find that setting up a sustainable waterbirth service and promoting it increases the number of women who book to give birth there (Nicoll et al., 2005; Winters & Duckett, 2006; Baxter, 2006). Midwives at Montrose Community Midwifery Unit worked with user representatives to address midwives' anxieties concerning the risks of waterbirths and to promote the pool (Nicoll et al., 2005). The pool was so popular that after a year 57% of women (n = 156) had waterbirths and an additional 111 used the pool in labour. Furthermore, there were no instances when a woman had to leave the pool because her midwife was not able to support her during the birth (Nicoll et al., 2005). Another birth centre installed a pool and found that between 2000 – 2003 there was a 35% increase in the number of women booking at the centre (Baxter, 2006). One hundred and twenty-nine women (79%) who birthed in the centre used the pool and, of these,

92 (71%) gave birth in the pool. An audit was carried out, and between 2001 – 2004, 229 women had a waterbirth. In fact, 64 (28%) had not anticipated staying in the pool for the birth but they felt so comfortable and relaxed that they decided to remain in it.

In 2000, the Royal College of Midwives sent a questionnaire to all Heads of Midwifery (HOMs) asking about the availability of a birthing pool in their maternity unit (Fyle, 2000). One hundred and six HOMs responded, but the total number of questionnaires sent out is not documented. Eighty-one maternity units supported waterbirths in both the hospital and home environment. Twenty units had no facilities or trained midwives to support waterbirths. Two units were able to facilitate home waterbirths and three others would support women in the hospital or at home as long as the women were willing to hire a birthing pool.

The Royal College of Midwives (RCM) has stated that all midwives should have the knowledge and competence to support women using a birthing pool (RCM, 2000). However, there is evidence that support for waterbirths is not universal among midwives (Winters & Duckett, 2006; Ockenden, 2001; Robinson, 2001). When setting up the Montrose waterbirth service it became obvious that there were some concerns, and the organising midwives decided that these were principally caused by midwives' lack of practical knowledge and confidence (Winters & Duckett, 2006). Baxter (2006) also had to overcome the apprehension some midwives voiced, but the majority were enthusiastic and became the 'driving force' to help implement the service. Study days were

organised and confident midwives provided a 24 hours on-call rota to support less experienced midwives until waterbirth became embedded as normal practice. Ockenden (2001) has anecdotal evidence from women attending her antenatal classes that midwives are subtly discouraging women from using hospital birthing pools by not providing information leaflets telling them about the availability of a pool to help them cope with contractions. Others feel that midwives are anxious about injuring their backs by having to stretch while providing care to women in the pool, or needing to lift them out in an emergency (Kitzinger, 2000).

It has been suggested that some of the reasons for midwives' continued resistance to water for labour and birth stem from the anxieties of obstetricians (Geissbuhler & Eberhard, 2000) who are ignoring the evidence published in midwifery journals because the data were obtained by non-randomised studies and audit (Ockenden, 2001). These data collection methods are thought to be less robust and provide evidence which cannot be used to predict outcomes and risk of harm for women because it is difficult to eliminate confounding variables, unlike the 'gold standard' RCT (Badenoch & Heneghan, 2002; p. 50). In 1994, two midwives were suspended from their NHS Trust for failing to follow the 'no birth in water policy' while caring for a woman using the pool at home (Anderson, 1994; Reid, 1994). The midwives requested that the woman leave the pool for the birth, as was Trust policy, but the woman refused. The midwives carried on providing care and the woman achieved a waterbirth with no problems. The following day the midwives were suspended and although the woman supported

the midwives, as did the United Kingdom Council for Nursing and Midwifery (UKCC), the RCM and Association for Improvement in the Maternity Services (AIMS), the Trust refused to change its position even though the issue of choice for women was very topical following the recent publication of the Changing Childbirth report (DH, 1993). This case led to some midwives refusing to support women using a pool at home because they were 'not trained' or it was 'not Trust policy' (Beech, 1997). This is evidence that the culture of a maternity unit has an effect on the care women are offered and on midwives' role and job satisfaction (Kirkham, 1999).

Although the UK government has recommended that the NHS should become more women-oriented (DH, 2005; DH, 1993; DHSS, 1983), in many maternity units which have installed pools, they are used infrequently (Kitzinger, 2005, p. 126). Kitzinger (2005, p. 132) claims that women who wish to use a birthing pool are increasingly informed by the service that:

- 'We don't have a midwife trained in waterbirth'
- 'Your blood pressure is slightly raised'
- 'The room is not free'
- 'I have a bad back'
- 'I don't do waterbirths'

Gould (2007), writing an editorial about the disappointing number of midwives who offer water as a method of pain relief in labour, asks whether moving care

from baths to birthing pools has been detrimental. She suggests that this move has led to the creation of 'waterbirth terminology' and 'technical and medicalised rules' for the use of birthing pools. Consequently, midwives have made the use of water appear too technical and, as a result, some midwives are avoiding use of the pool in case they do something wrong. Gould (2007) also suggests that midwives do not feel sufficiently confident to offer the use of a birthing pool on a medicalised labour ward and so restrict women's use of the pool. She also feels that other midwives may feel that their professional identity is questioned if they offer what they see as a non-technical intervention in the 'subliminally technological world' of the modern labour ward where the science of obstetrics takes on a dominant role.

In view of the conflicting information about midwives' attitudes towards waterbirths, a decision was made to investigate this issue further because midwives' support for the waterbirth service would be an important factor when conducting a future large RCT. This study is reported in Part 2 of the thesis.

1.11. Aims and Objectives of the Thesis

This thesis has three aims:

- The primary aim is to investigate whether it would be feasible to conduct a large, adequately-powered RCT to assess the effects of a waterbirth on the neonate to obtain more information for women who are considering a waterbirth.

Within this a key issue to consider is the effect randomisation has on women's childbirth experience. Therefore, following on from the first aim:

- The second aim is to explore women's expectations for childbirth, their satisfaction following childbirth and their thoughts about participation in a RCT and whether participation has a negative impact on their childbirth experience.

These two aims are addressed in Study 1 which is reported in Part 1 of this thesis (Chapters 3 and 4).

- The third aim is to assess midwives' attitudes to waterbirths. Results from the first study raised concerns that some midwives may not be supporting women in their desire to have a waterbirth and may even be denying them their choice of a waterbirth. Midwives' attitudes towards waterbirths are extremely important because they would impact on the success of a future RCT so requires further investigation.

This aim is addressed in a secondary study which is reported in Part 2 of the thesis (Chapters 5 and 6).

This thesis focuses on ten objectives:

1. To assess current research evidence about the effect of a waterbirth on the neonate.
2. To examine whether women will join a waterbirth RCT.
3. To examine whether the demographic data of women who randomised differ from the 'normal' pool users.
4. To investigate whether the expectations of women who randomise are representative of the 'normal' pool users.
5. To examine whether randomisation affects women's satisfaction with childbirth.
6. To obtain women's thoughts about participating in a waterbirth RCT.
7. To examine whether women would participate in a future waterbirth RCT.
8. To determine whether there are any problems with fetal/neonatal data collection.
9. To obtain a power calculation for a future RCT.
10. To investigate midwives' attitudes towards waterbirths.

1.12. Organisation of the Thesis

This thesis is divided into two parts: the first reports a waterbirth RCT (Chapter 3), and the results of questionnaires completed by women to assess the impact of randomisation on their childbirth experience (Chapter 4). The second part reports the findings of a study which investigates midwives' attitudes to waterbirths. The findings of these two studies are important to help to enable women to make an informed choice when deciding whether to have a waterbirth and to increase the opportunity to achieve a waterbirth.

This introductory chapter has provided a background to the two studies, by explaining the anxieties about waterbirths and the challenges around organising a waterbirth RCT, in order to gain an understanding of why the research studies were conducted.

Chapter 2 contains the literature review which details the evidence currently available from research studies into waterbirth. The review focuses on the neonate. It discusses the physiological effects of water immersion during childbirth and the concerns which have arisen about the possible effects on the neonate of maternal immersion in warm water during childbirth.

Chapter 3 reports a waterbirth RCT which was undertaken to assess the feasibility of organizing a larger multi-centre RCT to investigate the effect of a waterbirth on the neonate. This chapter also details the different research methods used to achieve the aims of the thesis.

Chapter 4 reports the findings of questionnaires, which women completed as part of the waterbirth study, to assess women's expectations and satisfaction with childbirth and also their thoughts about participating in the RCT to investigate the impact of randomisation on women's childbirth experience.

Chapter 5 details the findings of a literature review investigating midwives' attitudes to change and semi-structured interviews conducted with midwives in preparation for the Q Methodology study.

Chapter 6 reports the findings of a study using Q Methodology to investigate midwives' views and experiences of waterbirths.

Chapter 7 discusses the results of the waterbirth study and Q study and the implications for midwifery practice. Recommendations are provided for future waterbirth research.

CHAPTER 2: WATERBIRTH LITERATURE REVIEW

Chapter 1 identified that some healthcare professionals are concerned that waterbirths have been introduced without first evaluating the effects on the neonate (Aird et al., 1997; Pinette et al., 2004; Schroeter, 2004). Others have raised concerns, by letter or publication of case studies, about neonatal adverse events they have experienced in their practice (Rosevear et al., 1993; Parker & Boles, 1997; Vochem et al., 2001; Kassim et al., 2005). The purpose of this chapter is to explore and review the relevant waterbirth literature in order to inform the design of a waterbirth research study to investigate the effects of a waterbirth on the fetus and neonate.

2.1. Question and Aims

This literature review was guided by the question:

What is the effect on the neonate of maternal water immersion in a birthing pool for both labour and birth compared with a land birth?

The aims of this literature review were to:

I. Identify studies which looked at the physiological condition of the fetus and neonate following maternal immersion in water during childbirth.

II. Identify the benefits of a waterbirth for the neonate.

III. Identify the risks of maternal immersion for the neonate.

IV. Identify methods used to assess the physiological condition of the neonate during a waterbirth.

V. Identify information concerning assessment of birthing pool water.

2.2. Methods

To fulfil these aims, the literature search followed the process outlined by Aveyard (2007).

2.2.1. Search Terms

A combination of free text, thesaurus and MeSH terms were used to identify papers. Search terms were: water birth, waterbirth, water immersion, underwater, birthing pool, pool, tub, labour, pain relief, analgesia, non-pharmacological analgesia, midwi*, fetus, foetus, newborn, neonate, baby, childbirth, child birth, natural childbirth, delivery, alternative delivery, hydrotherapy, temperature, aspiration, breathing, infection, death, stillbirth, resuscitation, physiology.

2.2.2. Inclusion and Exclusion Criteria

The emphasis of this literature review is the physiological condition of the fetus and neonate following maternal immersion in water during both labour and birth (first and second stages of labour) and the assessments undertaken by midwives to check wellbeing. Also of interest was information about the birthing pool and bacterial assessment of the water.

The searches were restricted to research and audit concerning low-risk pregnant women. Research and audit focusing on women who were having a complicated pregnancy or birth were excluded because the majority of maternity units recommend that these women should not use the pool for childbirth. Furthermore, it may be difficult to decide whether an adverse event is caused by the pregnancy complication or the immersion in water.

Papers which reported audit findings were included for pragmatic reasons because audit may provide information about aspects of care which have not been well researched (Aveyard, 2007), as is the case with waterbirths. Midwives frequently carry out audit projects nowadays and the results can play an important role in providing information about midwifery care (Rees, 2003; Murphy-Black, 2000). Audit which is undertaken systematically can be important in identifying topics which require further evaluation (Smith, 1999) by using research methods (Sackett, 2000). However, it is acknowledged that the results

of audit do not provide new information, nor are they generalisable to the wider population (Rees, 2003).

The outcomes for the mother are not included except where there may be an impact on the fetus or baby: for example, physiological temperature changes due to water immersion.

It was decided to exclude research and audit which investigated use of whirlpools, spa baths and hot tubs because of the possible increased risk of infection from contamination of the mechanical equipment by faeces or blood. Although these types of pool are used abroad, there is no evidence that units in the UK have this facility. The full inclusion and exclusion criteria are shown in Table 2.1.

Table 2.1: Inclusion and Exclusion Criteria.

Inclusion Criteria	Exclusion Criteria
Research and audit providing information on the physiological condition of a fetus during maternal immersion for both the first and second stages of childbirth.	Research and audit focusing on maternal water immersion for the first stage of labour only.
Research and audit providing information on the physiological condition of a neonate following a waterbirth.	Research and audit focusing on maternal water immersion for the second stage of labour only.
Research and audit providing information on maternal temperature during water immersion.	Research and audit involving use of whirlpools, spa baths or hot tubs for childbirth.
Research and audit providing information on the birthing pool which may impact on the condition of the fetus/baby: pool water temperature, pool water samples for bacterial colonisation.	Research and audit focusing on maternal outcomes.
Research and audit focusing on women who are at low-risk of complications.	Research and audit focusing on traditional birthing methods other than waterbirths.
Papers published in English.	Research and audit focusing on women who have a waterbirth having already had a complicated pregnancy or birth: for example, waterbirth after a previous caesarean section, raised blood pressure, prolonged labour.
	Qualitative research focusing on maternal views and experiences of waterbirths.
	Commentary papers giving individual professionals' views on waterbirths.
	Papers published in languages other than English.

Table 2.2 provides information about the databases and websites which were searched for papers. No publication date or methodological restrictions were applied. Hand-searching of obstetric, midwifery, nursing and paediatric journals available in local libraries was undertaken covering the publication dates 1995 – 2011. Hand-searching ensured that the electronic search had not missed relevant papers.

The abstracts identified by the searches were scrutinised and all papers which appeared to meet the inclusion criteria were retrieved. These papers were read and assessed to ensure they did actually match the criteria. The reference list of all relevant papers was also scanned to obtain additional articles which might be of interest.

Table 2.2: Illustrates the Electronic Databases, Journals and Websites Searched

Electronic databases and websites searched for relevant articles

Health Databases

- Medline
- Embase
- Cochrane Database
- Health Technology Assessment (HTA)
- CINAHL
- British Nursing Index
- Database of Abstracts of Reviews of Effects (DARE)
- PsychINFO
- MIDIRS

General Websites

- Royal College of Midwives
- Web of Science
- Google Scholar

Academic Website

- EThOS

Journals

- British Journal of Midwifery
- Midwifery
- Journal of Advanced Nursing
- RCM Midwives
- Birth
- MIDIRS
- JOGNN
- Practising Midwife
- British Journal of Obstetrics & Gynaecology (BJOG)
- The Journal of Pediatrics
- American Journal of Obstetrics & Gynecology (AJOG)
- Journal of Neonatal Nursing
- Journal of Family Health Care

2.3. Results of the Search

One Cochrane Systematic Review relating to waterbirths was identified (Cluett & Burns, 2009) which investigated the effect of water immersion at any stage during childbirth on fetal, neonatal, maternal and midwife outcomes. The review identified 11 RCTs which the authors judged suitable for inclusion. The trials looked at different time-frames of water immersion in childbirth. However, only one RCT investigated both the first and second stages of labour (Woodward & Kelly, 2004) which is reported in Chapter 3. The other RCTs did not match the inclusion criteria for this literature review because they investigated either immersion during the first stage of labour or immersion for only the second stage of labour.

One additional waterbirth RCT (Chaichian et al., 2009) from Iran, which investigated women's acceptance of the introduction of a waterbirth service as a way to reduce the number of Caesarean sections, has reported since the systematic review was published. There was information concerning the Apgar score to assess the condition of the neonate so the study has been included in this review.

The other studies identified were non-randomised prospective (Geissbuhler et al., 2002; Forde et al., 1999; Geissbuhler & Eberhard, 2000; Hawkins, 1995; Fehervary et al., 2004; Zanetti-Daellenbach et al., 2007; Zanetti-Daellenbach et

al., 2006a; Zanetti-Daellenbach et al., 2006b; Ros, 2009;) and retrospective studies (Otigbah et al., 2000; Eldering & Selke, 1996; Burke & Kilfoyle, 1995; Aird et al, 1997), two national surveys (Alderdice et al., 1995; Gilbert & Tookey, 1999) and audit reports giving information about the condition of the baby after labour and birth in water (Rosenthal, 1991; Brown, 1998; Cro and Preston, 2002; Garland, 2002; Thoni et al., 2004; Garland, 2006).

2.4. Physical Aspects of Waterbirth

This section of the review will examine the literature identified concerning the effects of warm water on maternal, fetal and neonatal physiology and explain the anxieties heathcare professionals have concerning waterbirths.

2.4.1. Fetal-maternal thermoregulation

One important major national survey, carried out by the British Paediatric Surveillance Unit, sent postal questionnaires to all NHS maternity units (Gilbert & Tookey, 1999). The survey, undertaken between 1995 and 1996, obtained information on all babies born in water during the two years. They analysed 4032 waterbirths and found that out of 32 babies admitted to a neonatal intensive care unit (NICU) hypoxic ischaemic encephalopathy was diagnosed in 5 babies (rate 1.2 per 1000 live births, confidence interval 0.4 – 2.9). This is similar to the estimated figure of 2 per 1000 live births for traditional land births (Gilbert & Tookey, 1999). This is the largest analysis of waterbirths in the UK. However,

the authors warn that the compliance with completion of the questionnaires fell during the second year, so these figures may not be accurate.

A small, explorative, descriptive survey was carried out in South Africa to examine the outcomes for neonates after waterbirths (*n* = 27) compared with land births (*n* = 27) (Ros, 2009). It was found that the temperatures of the land babies were lower than the waterbirth babies with 41% (*n* = 11) of the land birth babies and 15% (*n* = 4) of the waterbirth babies having hypothermia demonstrated by an axillary temperature of less than 36.2^0C. Hyperthermia (an axillary temperature greater than 37.5^0C was observed in 4% (*n* = 1) of the waterbirth babies versus none in the land birth group. However, Geissbuehler et al. (2002), in a small non-randomised prospective study, examined the maternal temperatures of 30 waterbirth women and 17 women who had a land birth at different time frames of labour: on admission to the delivery ward, on entry to the pool, at birth and on exit from the pool. The only statistical difference between the groups was at birth: the mean maternal temperature in the waterbirth group was 36.9^0C compared with 36.3^0C for the land births: both between normal parameters. The difference did not affect the neonate as no statistical difference was found between the two groups despite the maternal temperatures being significantly higher in the waterbirth group. Zanetti-Daellenbach et al. (2006b) in their prospective observational study also found no statistical differences for instances of pyrexia in 89 babies who had a waterbirth and 146 land birth babies. Although reassuring, these studies may have been too small to detect any difference between the waterbirth and control groups.

Deans and Steer (1995) reported, in an audit of 112 waterbirths, that four women left the pool due to fetal tachycardia. They were pyrexial with temperatures between 37.5^{0}C and 38.4^{0}C. After leaving the pool, the fetal heart rate returned to normal within an hour. Another woman who was observed to have fetal tachycardia did not leave the pool. Cold water was added and the fetal heart rate and maternal temperature both returned to normal levels within the hour. All five women had normal vaginal births and there were no neonatal concerns. Forde et al., (1999) reported that two babies suffered from hypothermia (below 35^{0}C) 30 minutes after the birth but had normal temperatures 30 minutes later.

These studies indicate that there is no evidence to confirm anxieties about fetal maternal thermoregulation being affected by immersion in warm water because there was no statistical difference found regarding neonatal temperature for a waterbirth baby compared with a land birth. However, most of the studies are small and non-randomised so the results may not be reliable.

2.4.2. Water Aspiration by the Neonate

Another process which may be affected by the water temperature is the initiation of the diving reflex to prevent the neonate breathing after birth while still under the water (Johnson, 1996). If this protective mechanism is disrupted, one serious consequence is the risk that the baby will inhale pool water which may be

contaminated by blood and faeces and may drown (Rosser, 1994; Nguyen et al., 2002; Kassim et al., 2005).

Gilbert & Tookey (1999) in their large two-year survey of maternity units compared perinatal mortality and morbidity for babies born in water with babies born on land. The data were collected from paediatricians who were asked each month to report whether they knew of any deaths which met the criteria. It was reported that 13 (0.3%) out of 4032 babies required ventilation or other respiratory support for conditions such as transient tachypnoea of the newborn, 'wet lung', suspected aspiration or 'fresh water drowning'. Although a small percentage of babies were affected, these conditions may to be linked to birth underwater but the authors do not discuss the individual circumstances. The evidence is therefore inconclusive for the purpose of this review.

Rosenthal (1991) audited the outcomes of 679 waterbirths and reported eight cases of 'wet lung' and one case of a baby with meconium aspirate. However, a large prospective study by Geissbuhler & Eberhard (2000) analysing 2011 waterbirths identified no cases of water aspiration.

Despite concerns raised by paediatricians about the risk of water aspiration or drowning, this event appears to be uncommon. However, because it is rare, the only reliable way to determine the risk of aspiration following a waterbirth

compared with a land birth would be to undertake a large, adequately powered RCT.

2.4.3. Infection

Infection caused by contamination from stagnant water in pipes and water hoses has been raised as an issue (George & Hobbs, 1990; Robb et al., 1991; Rawal et al. 1994). It is also thought that the warm temperature of the water may provide the ideal conditions for bacteria to multiply (Zanetti-Daellenbach et al. 2007) so increasing the chance of neonatal colonisation.

A small study undertaken in Germany specifically investigated the risk of fetal and maternal infection following a waterbirth (Fehervary et al., 2004). There were three phases in the study. In the first, they compared the outcomes for babies born in water (n = 34) with babies born on land (n = 36) and a third group whose mothers received water immersion in the first stage of labour. The results for the third group will not be discussed in this review. Consent was gained from the women who participated. Swabs were obtained from each baby's ear and palate. In the waterbirth group 44% of the palate swabs and 9% of the ear swabs were negative compared with 53% palate and 11% ear swabs in the land birth group. In both groups the most common bacteria identified were *Staphylococcus epidermidis*, *Escherichia coli*, non-haemolytic *streptococci*. In both groups

Staphylococcus aureus and *Candida albicans* were also found occasionally. *Corynebacteriaceae* and *Proteus spp*. were only seen after a land birth. *B streptococci* and *Citrobacter spp*. were only identified from the waterbirth swabs. In a second part to their study the outcomes for 100 babies born in water were compared with 100 born on land. There were no significant differences between the groups. Three of the waterbirth babies were diagnosed with a bacterial infection and were treated with antibiotics compared with 2 of the land birth group. However, in two of the three waterbirth cases, the mother had prolonged pre-labour ruptured membranes (> 24 hours) compared with none in the land birth group. These women and their babies would be at increased risk of infection and require intravenous antibiotics during labour. However, it is not stated whether they were administered. The third phase of the study was to send a questionnaire six months after the birth to 100 women who had a waterbirth and 100 women who had a land birth. The authors do not explain whether these are the same women in phase two of the study. The response rate was 60% in the waterbirth group and 47% from the land birth women. The waterbirth women reported that 19 babies (31.7%) had suffered from an infection which included: 12 cases of common cold, varicella infection and non-specified infections. In the land birth group 13 babies (27.7%) had infections which included: 7 cases of common cold, 2 cases of otitis media, I case of conjunctivitis, 1 case of enteritis and 1 non-specified infection. The waterbirth babies suffered slightly more infection than the land birth babies.

A similar finding was obtained from another very small comparative study which was undertaken to assess the rates of colonisation and infection in mother and baby following a waterbirth (Hawkins, 1995). The sample was 16 women who gave birth in the pool and the next woman to give birth on land was used as a control. The 32 women and their babies were monitored for seven days for signs of infection. The neonatal swabs were obtained from the axilla, ears, umbilicus, and groin as soon as possible after the birth. When the 32 cases were analysed, it was noted that one baby was colonised with *Pseudomonas aeruginosa* in the ear and groin. At five days old further samples were taken from septic spots and *Pseudomonas aeruginosa* and *Acinetobacter sp*. were identified. The pre-use pool water sample was also noted to be contaminated with the same bacteria, so the pool was closed until the source of contamination was found. In the waterbirth group eight of the babies had the same organism as the mother: four had *Staphylococcus epidermides* and two had *Escherichia coli* cultured. In the control group, four babies had the same organism present as the mother: in three cases *Staphylococcus epidermidis* was present, one had *Streptococcus faecalis*, one had *Enterobacter sp*. During the seven day monitoring period, two waterbirth babies developed 'sticky cords'. Culture of swabs showed one had *Enterococcus faecalis* and *Escherichia coli* present; this baby also developed a neck blister and *Staphylococcus aureus* was isolated. The second baby's swabs showed *Staphylococcus aureus*. Hawkins (1995) does not explain whether women knew swabs were obtained from their baby or whether the babies whose swabs cultured bacteria were treated with antibiotics. The researcher concluded that babies who are born in water have a greater risk of colonisation with micro-

organisms. However, it is too small a study to determine whether this conclusion is correct because the results could have been obtained by chance.

However, Aird et al. (1997) when comparing 100 women who had a waterbirth with 100 who had a land birth found no cases of neonatal infection. Gilbert & Tookey (1999) in the large national survey concluded that they were neither able to confirm nor dismiss concerns about neonatal infection. Geissbuhler & Eberhard (2000) in their large prospective comparison of 2,014 waterbirths and 2,262 land births found that the neonatal infection rate was not significantly different between the groups (0.6% of waterbirth babies and 1.05% land births; $p = >0.05$). In fact the authors surmise that because the water is continually renewed while a woman is in the pool, the risk of infection is low. Unfortunately, the authors highlight a problem of missing neonatal data which may have impacted on the analysis. Brown (1998) reported an audit involving 541 women who used a birthing pool in a three year period. Two babies had sticky eyes, and ear swabs from two babies cultured *Pseudomonas aeruginosa* which would indicate a low incidence of neonatal infection (0.74%). However, *Pseudomonas aeruginosa* is found in stagnant water so it has to be presumed that the babies' infection may be linked to the waterbirth and would not have occurred if born on land.

There is evidence that birth in water may protect a baby from bacterial colonisation. Zanetti-Daellenbach et. al. (2006a) investigated whether babies

born in water are at increased risk of colonisation by Group B streptococcus (GBS). Two groups of women were compared: one group which gave birth in water and the other group which used water immersion for the first stage of labour. The researchers screened the women for GBS towards the end of pregnancy and found that 31.25% of the women in the waterbirth group and 34.8% in the immersion group were GBS carriers (p = 0.854). A water sample was obtained when the women left the pool. There was a significant difference between the groups. In the waterbirth group 65% of water samples were positive compared with 25% in the immersion group (p = 0.022). Analysis of the neonatal pharyngeal swabs revealed that 15% were positive in the waterbirth group compared with 31% in the control group (p = 0.42). This was a small study but it would seem that even when water is significantly colonised with GBS after a waterbirth compared with water immersion, the baby does not appear to be at risk of acquiring the bacteria. In fact the authors conclude that waterbirth may protect the baby by providing a 'wash out effect' at delivery.

Support for this conclusion is provided by one Italian low-risk maternity unit, where 52% of babies are born in water. The unit audited 741 waterbirths to assess whether there is an increased risk of neonatal infection (Thoni et al., 2004). They obtained pool water samples before pool use and after delivery. They had a control group comprising babies born on land, but did not explain how the control group was chosen. Although bacteria were found in the pool water samples there was no increased risk of infection for the waterbirth babies 1.34% (n = 10) compared with 3.4% (n = 15) land babies.

Forde et al. (1999) matched women in a non-randomised prospective study. Ninety-five women used the pool but only 49 achieved a waterbirth. Samples of pool water were obtained before the women entered the pool and after the birth. One of the post-delivery samples did identify *Staphylococcus aureus* but the organism was not obtained on the neonatal swabs. Group B Streptococcus was cultured from a second post-delivery pool water sample and also from the baby's ear swab. Coliforms were also isolated mainly from the first pre-entry to the pool sample and Bacillus sp. from the post-delivery samples but these appeared to cause no problems to the neonate. *Pseudomonas aeruginosa* has been cultured from a pool water sample obtained before the woman entered the pool (Brown, 1998) which probably indicates that the water was contaminated from stagnant water remaining in the pipes.

Waterbirths do not therefore seem to increase the risk of infection but there is enough conflicting information about the risk of neonatal infection following a waterbirth compared with a land birth to indicate that a large RCT is required to address this concern.

2.4.4. Water Immersion and Risk of Tearing of the Umbilical Cord

In the major two-year survey of maternity units undertaken by the British Paediatric Surveillance Unit, it was reported that five babies, out of 4032 waterbirth babies, were admitted to NICU because their umbilical cords had

snapped (Gilbert & Tookey, 1999). The authors admit that this was a surprise finding, because it was the first time that tearing of the umbilical cord was linked with waterbirths, and they warned midwives to be vigilant.

Cro & Preston (2002) audited 100 waterbirths which revealed that there were four instances of a snapped umbilical cord. In three cases the midwife noticed that the cord had torn and it was quickly clamped with no adverse effect on the baby. The danger for the neonate is when the situation is not recognised immediately. In the fourth case, the baby was noted to have problems breathing and was looking pale. The midwife observed that there was a lot of blood in the pool, the cord was examined and found to have snapped and was clamped immediately. The baby had a heart rate of only 40 – 60 beats per minute, bag and mask ventilation was given and the baby was transferred to the special care unit. A blood transfusion was given and the baby remained in the unit for three days for observation. The baby was followed up at eight weeks of age and there were no problems.

In a birthing centre audit of 679 waterbirths, there were four (0.59%) partially torn or snapped umbilical cords when the mother brought the baby to the surface of the pool (Rosenthal, 1991). One baby required a transfusion.

Whether a baby is placed at increased risk of haemorrhage via a torn umbilical cord is unresolved from these studies, even though two studies had a large database (Gilbert & Tookey, 1999; Rosenthal, 1991). However, both the studies

did not have a comparison control group to obtain information about the risk with land births. Therefore, a large adequately powered RCT is required to address this concern.

2.4.5. Water Immersion and Polycythaemia

There have been cases of polycythaemia and hyperbilirubinaemia recorded after waterbirths (Forde et al., 1999; Fehervary et al., 2004). However, hyperbilirubinaemia does also occur following a land birth. In a study comparing 100 waterbirths with 100 land births, two waterbirth babies were diagnosed with hyperbilirubinaemia. In the land birth group, one baby had hyperbilirubinaemia (Fehervary et al., 2004).

In the British Paediatric Surveillance Unit's survey of 4032 waterbirths no incidences of polycythaemia and hyperbilirubinaemia were reported (Gilbert & Tookey, 1999). It has to be remembered that the information concerning neonatal adverse events deteriorated during the final year of the survey because of non-compliance, so this data might not be reliable. This would suggest that a larger study, with a control group, would be required to assess whether there is an increased risk with waterbirths.

2.4.6. Waterbirth and Admission to Neonatal Intensive Care

National surveys have provided greater information, than audit and retrospective studies about admission to NICU in the UK. Alderdice et al. (1995) in their survey reported on 4,494 women who gave birth in water and an additional 8,255 women who laboured in the pool and noted that 51 babies experienced problems after the birth. The problems were described as 'including respiratory problems and infection' but no additional information was provided. The authors do not say whether this morbidity was related to water immersion or how long the babies remained in NICU.

More information is provided in the large national study (Gilbert & Tookey, 1999) which found that 35 babies were admitted to a special care unit after delivery or within 48 hours of their birth. Of these 32 survived and three died. Thirteen of the babies who survived needed respiratory support, fifteen had lower respiratory tract problems. Evidence of infection was reported in two babies who survived: group B streptococci (GBS) in one baby's mother's high vaginal swab, and GBS from the second baby's skin swabs. Fifteen of the babies admitted to special care units had other reasons for admission. Five babies had snapped umbilical cords, one developed hypoxic ischaemic encephalopathy grade 3 and had transposition of the great arteries, three had stridor and one had shoulder dystocia. No reason was provided to explain why the remaining four babies needed special care. The conclusion, following analysis of the data, was that

there is no evidence of increased risk of admission to a special care unit for a baby born in water compared with the baby of a low-risk mother born on land. The authors state that because of the small numbers experiencing adverse events it would be difficult to judge whether the low-risk could be lowered even more by a conventional birth. The authors warn that the figures for neonatal admission may be under-recorded because they were reliant on information from clinicians and compliance with sending data deteriorated as the survey progressed.

Otigbah et al. (2000), in their retrospective case-controlled study, matched 301 women who had waterbirths with 301 women who had land births. The controls were obtained from the birth register as being the next parity-matched low-risk women who had a straightforward birth. Two babies from the waterbirth group were admitted to NICU, one because of an undiagnosed compound presentation and the second was associated with a true knot in the cord which could occur at any birth. Five babies in the control group were admitted to NICU but the reason for admission was not reported. Forde et al. (1999) in their small non-randomised prospective matched-pairs study involving 49 women who had a waterbirth, reported one waterbirth baby was admitted to NICU for treatment of polycythaemia and jaundice. However, some authors reported no direct NICU admissions (Ros, 2009; Aird et al., 1997).

Rosenthal (1991), in an audit, noted that eight waterbirth babies (1.2%) were transferred from the birthing unit to hospital with conditions such as transient

tachypnoea (*n* = 3), prematurity (*n* = 1), major anomaly (*n* = 1), torn umbilical cord (*n* = 2) and testicular torsion (*n* = 1). Unfortunately, there is limited information about the outcomes for the babies. Although many of the reasons for transfer were clearly not due to the waterbirth (major anomaly, prematurity, testicular torsion), it would be interesting to have more information on the transient tachypnoea and how the babies recovered. In the UK it would be unusual for a premature baby to be born in water. Rosenthal (1991) reported that two babies were admitted to hospital at a later date for a sepsis screen because their paediatricians realised that they had been born under water. However, no infection was identified. Ros (2009), in the small, explorative descriptive survey, reported that one of the 27 waterbirth babies was subsequently admitted when 10 hours old with sepsis and congenital pneumonia. The cause was stated as being unknown.

Fehervary et al. (2004) reported that six babies (6%) in the waterbirth group were referred to a children's hospital compared with 7 (7%) in the land birth group. Others have found no statistical differences in admission to NICU when comparing waterbirth and land birth babies (Zanetti-Daellenbach et al., 2006b).

The evidence concerning risk of admission to NICU following a waterbirth is inconclusive so a large RCT is required to explore this issue further.

2.4.7. Water Immersion and Risk of Neonatal Death

In the first UK survey investigating waterbirths (Alderdice et al., 1995), Heads of Midwifery reported the deaths of 12 babies who died after their mother laboured or gave birth in water. The authors state that no deaths were attributable to water immersion but Atalla & Weaver (1995) felt that, because the women who use a birthing pool are at low-risk of complications, this was an unacceptably high rate of deaths. Unfortunately, the authors do not explain why it was concluded that the deaths were unrelated to maternal immersion, nor the circumstances surrounding the deaths. It may have been because they were dependent on obtaining the information from maternity units and healthcare professionals involved in the cases who may have been reluctant to disclose the facts.

In order to ensure complete data on neonatal mortality in their survey, Gilbert & Tookey (1999) maintained contact with local regional co-ordinators of the confidential inquiry into stillbirths and deaths in infancy to check whether they had knowledge of any deaths following a water labour or birth. There were five perinatal deaths (perinatal mortality rate 1.2 per 1000 live births) among the births in water (95% confidence interval 0.4 to 2.9). When comparing with low-risk women who had a land birth there was no statistical difference in perinatal death – relative risk 0.9 (99% confidence interval: 0.2 to 3.6). Two of the babies were stillborn. However, one was the result of a concealed pregnancy and the other stillbirth was diagnosed before water immersion. One has to question why these were included in the survey results. Furthermore, the three postpartum deaths

involved abnormal pathological findings unrelated to the waterbirth (one died aged 30 minutes with an intercranial haemorrhage after a precipitate delivery, the second died at 8 hours old and was found to have hypoplastic lungs, the third died at 3 days of age with neonatal herpes infection). Women who gave birth in a conventional bath were included. As the water is not so deep in a conventional bath, which could cause problems at the birth, it would be interesting to know whether any of the adverse events occurred in this group of babies. The conclusion following analysis of the data was that there is no evidence of increased risk of perinatal death.

Brown (1998), in a three year audit of 343 women who had waterbirths, reported one neonatal death due to intracranial haemorrhage. Again no further details are provided (Brown, 1998).

In most UK hospitals, women who use a birthing pool are regarded as being at low-risk of complications. Therefore, any stillbirth or neonatal death would be a concern. However, the deaths reported in the British Paediatric Surveillance Unit survey were not linked with the waterbirth but a much larger study, with a control group, is required to assess the risk of death because the occurence rate is so low.

2.5. Birthing Pool Water Temperature

As has been previously discussed, one important factor for the wellbeing of the neonate may be the temperature of the pool water which will now be explored in greater detail.

Eldering and Selke (1996, p. 27) in their matched-pairs retrospective study of 1000 waterbirths, reported that women decided the temperature themselves, but then stated that 'we ensure the temperature is kept between 32^0C to 36^0C' which confines the range women can choose. Some units maintain the temperature between 36^0C – 37^0C (Forde et al., 1999). It is difficult to assess how high the maternal temperature has to rise, and for how long it has to remain high, before disrupting fetal-maternal thermoregulation.

As the temperature of the water is thought to be important to the wellbeing of the neonate born under water, Geissbuhler et al. (2002) decided to investigate whether guidelines are necessary for birthing pool water temperatures. They obtained data on the pattern of water temperature and the resulting body temperature of a small group of low-risk women (n = 47). Of the 47 women, 30 choose a waterbirth and 17 a land birth. The water temperature was measured electronically every two minutes. Each woman was able to maintain the pool water at a temperature comfortable for her. The maternal axillary temperature was measured every 30 minutes from the time she arrived at the hospital in

labour and until an hour after the birth. The mean water temperature at the beginning of pool use was 35.2^{0}C and when the woman got out of the pool it had reduced to 32.9^{0}C. The range per woman was from 23^{0}C to 38.8^{0}C during the first stage of labour. For the second stage, the temperature ranged from 33^{0}C to 38.2^{0}C. The mean time women were in the pool was 98 minutes (range 28 – 364 minutes). The mean maternal temperature on arrival at the hospital was 36.3^{0}C and had risen to 36.7^{0}C on pool entry. At the time of the birth the mean temperature was 36.9^{0}C and did not decrease in the hour after birth. For the land birth women, the mean temperature on arrival to the hospital was 36.4^{0}C and was 36.3^{0}C for the birth and 36.6^{0}C an hour after birth. On analysis, the neonatal temperature, which was recorded per rectum at 15 and 60 minutes after birth, did not vary between the groups ranging, between 36.8^{0}C and 37^{0}C.

Although this was a small study, all the maternal temperatures remained within normal levels despite the variation in water temperature. It was also reassuring that all the neonatal temperatures were within a normal range. Geissbuchler et al. (2002) stated that humans are able to maintain their body temperature at a constant level, despite fluctuations in environmental temperature which they describe as 'in born code of body temperature regulation'. They also warn that if this temperature regulation mechanism is interfered with by enforcing strict guidelines for water temperature, rather than the woman herself deciding the temperature, it could 'dangerously disrupt the physiological control system' which would be detrimental to women and the neonates.

Although the evidence from this review is reassuring, to obtain more detailed information about the appropriate temperature ranges for pool water during a waterbirth, a larger study is required.

2.6. Assessment of the Fetus and Neonate Following Waterbirth

This section of the review will describe the methods used to assess the wellbeing of the fetus and neonate during water immersion and immediately after birth. While in utero the fetus is dependent on its mother for oxygenation, nutrition, thermoregulation and excretion (Lowe and Reiss, 1996). At birth the neonate has to make a sudden transition to become an independent individual. There are various assessments midwives use to judge the baby's condition at birth and unfortunately there is little consistency across the studies and audit projects. The main assessments are described next.

2.6.1. Time to First Breath, Resuscitation and Intubation

The time lapse between birth and a neonate taking the first breath is an assessment midwives record for fetal wellbeing but may be affected by drugs used by the mother during labour. Most babies initiate breathing within 60 seconds of birth (Farrell & Sittlington, 2009, p. 750). If this does not occur, prompt resuscitation has to be implemented and intubation may be required; therefore, another method of assessing the condition of a newborn baby is

incidence of resuscitation. This can be subjective as different midwives and doctors may have different thresholds for starting the procedure. Few studies report this assessment. Otigbah et al. (2000) stated that none of the 301 babies in their study took their first breath under the water. Ros (2009) found that one out of 27 neonates in the land birth group required oxygen via a bag and mask compared with none in the waterbirth group. Forde et al. (1999) noted two babies were found to have both clinical and biochemical evidence of mild asphyxia but responded well to basic resuscitation.

2.6.2. Apgar Score

The Apgar score has been used internationally to assess the condition of a neonate for over fifty years but can be affected by infection, maternal sedation and prematurity (Leuthner & Das, 2004). The score is calculated one minute, five minutes and ten minutes after the birth (Apgar, 1953).

The Cochrane Systematic Review (Cluett & Burns, 2009) concluded that there were no differences for a baby having a waterbirth with regard to Apgar score of less than seven at five minutes (Odds Ratio (OR) 1.59, 95% CI 0.86 to 1.75, five trials). However, in many of the trials the babies were not born in water because they only investigated immersion during the first stage of labour. Chaichan et al. (2009) in their RCT found no statistical differences in Apgar score when comparing land births with waterbirths. This was also the finding of other studies (Zanetti-Daellenbach et al., 2006a; Fehervary et al., 2004; Otigbah et al., 2000;

Aird et al., 1997; Eldering & Selke, 1996, p. 28; Burke & Kilfolye, 1995). However, when comparing neonatal outcomes (2011 waterbirths and 2354 land births), Geissbuhler & Eberhard (2000) found that the mean Apgar score at five minutes was significantly different: 9.8 compared for waterbirth babies with 9.6 for the land birth babies (p = <0.0001). Although a non-randomised study, this is a reassuring finding from a study with over 2000 waterbirths in each study arm.

It is difficult to compare studies because different standards have been set for the Apgar score. Garland (2002) acknowledges that the important issue surrounding waterbirths has been the condition of the neonate following a waterbirth. The collaborative audit group set an Apgar of less than seven at five minutes as the marker for the baby's condition. There was one (0.1%) Apgar score of < 7 at five minutes for primips in the waterbirth group compared with five (0.7%) in the control group. In the multips waterbirth group there were two (0.1%) compared with seven (0.53%) for land birth. Ros (2009) set a marker for a low Apgar score as < 7 as decided by Garland (2002). None of the babies in the waterbirth group had Apgar scores < 7 compared with 11% (n = 3) at one minute and 4% (n = 1) at five minutes in the land birth group. Rosenthal (1991) also reported no instances of waterbirth babies having Apgar scores <7 at 5 minutes when auditing the outcomes of 679 waterbirths. Brown (1998) found that 94% of waterbirth babies' scores were 7 or more at one minute, and 99.7% at five minutes. Of the 6% of babies whose Apgar score was less than 7 at one minute, all except one scored 8 or more at five minutes. One baby was admitted to the special care baby unit for 24 hours. Another baby had cyanotic attacks three and 14 hours after birth but

no cause was identified. Forde et al. (1999) set a bench mark of ≥ 8 at five minutes. All babies fell into this category.

To obtain more reliable information about whether a waterbirth affects the Apgar scores, a large RCT would be required which would obtain consistent data on all babies.

2.6.3. Umbilical Cord Blood Gas Analysis

Many obstetric units obtain cord blood from the umbilical vein and arteries to assess the condition of the baby at birth particularly when there has been a problem at the birth (Nordstrom and Arulkumaran, 1998). As with comparing Apgar scores between studies, it is difficult to interpret the findings regarding umbilical cord blood analysis. One researcher reported pH without specifying which vessel (Ros, 2009), others reported umbilical artery pH (Fehevary et al., 2004; Thoni et al, 2004; Geissbuhler & Eberhard, 2000; Eldering & Selke, 1996, p. 29) or umbilical venous pH (Zanetti-Daellenbach et al., 2007) or both arterial and venous pH (Zanetti-Daellenbach et al., 2006b; Geissbuehler et al., 2002). Ros (2009) compared umbilical cord blood pH and the mean value for both the waterbirth and the land birth group was 7.26 which is within the normal range for a newborn. Fehevary et al. (2004) also reported no significant differences between land and water births: the umbilical artery pH was 7.25 in the waterbirth group and 7.23 in the land birth group. Thoni et al. (2004) found no statistical

differences in cord arterial pH and base excess when comparing 741 waterbirths with land births. However, Geissbuhler & Eberhard (2000) found that the cord arterial blood pH was statistically significant between the two groups: 7.30 after a waterbirth and 7.26 for the land birth group (p = <0.0001). Zanetti-Daellenbach et al. (2007) found the umbilical cord venous pH was significantly lower in the land birth group, 7.35 compared with 7.38 (p = 0.05), although there was no difference in umbilical arterial pH between the groups, which is the important measurement to reflect neonatal condition (Zanetti-Daellenbach et al., 2006b). Geissbuehler et al. (2002) also found that the venous pH was significantly different: 7.4 for the waterbirth group and 7.37 for the land birth group.

It is unlikely that this assessment would be undertaken in a midwifery-led unit, unless based alongside an obstetric unit, because the necessary blood gas analysis equipment would not be available. This would need to be considered when planning a large RCT.

2.6.4. Fetal and Neonatal Heart Rate

In any birth fetal tachycardia or bradycardia may be linked to maternal pyrexia, maternal dehydration or fetal compromise leading to fetal hypoxia (McCormick, 2009, p. 488). There were cases of fetal tachycardia reported by researchers (Geissbuehler et al., 2004; Deans & Steer, 1995) but the majority of studies did not seem to report these recordings. This may be because the woman should be

asked to leave the pool if a midwife suspects fetal compromise. Forde et al. (1999) reported that six babies, in their non-randomised study, had tachycardia and/or tachypnoea after birth but there were no clinical concerns and the rates settled spontaneously.

2.6.5. Meconium Stained Liquor

Midwives should observe for signs of meconium stained liquor which could indicate that the fetus is compromised (Farrell & Sittlington, 2009, p. 749). Geissbuhler & Eberhard (2000) found instances of meconium stained liquor in all their groups: 100 women (5%) in waterbirth group, 297 women (12.6%) in the land birth group, and 101 (9.1%) women who used a birthing stool. This lower percentage for the waterbirth group is reassuring. However, if a concern about the condition of the fetus was identified, women would not be able to use the pool, so this would screen out many cases before pool use.

2.6.6. Long-Term Follow-up

Only one study was identified which carried out longer-term follow-up of waterbirth babies - by telephone contact two weeks after birth (Ros, 2009). All mothers reported that their babies were healthy (Ros, 2009).

2.7. Discussion

Maternity units have been encouraged to provide women with the opportunity to use warm water as a method of pain relief in labour (NCCWCH, 2007; DH, 1993). However, waterbirths have been introduced with limited evaluation despite many healthcare professionals' requesting an assessment of the risks surrounding waterbirths (Ros, 2009; Schroeter, 2004; Beake, 1999; Aird et al., 1997; Atalla & Weaver, 1995; Walker, 1994). Proponents of waterbirths state that the hydrokinetic and hydrothermic properties of water are beneficial for women during childbirth (Odent, 1983; Gordon, 1991). A Cochrane Systematic Review (Cluett & Burns, 2009) concluded that there is evidence that water immersion during the first stage of labour reduces the use of epidural analgesia but emphasised that there is too little information concerning the second stage of labour and the effects on the neonate.

A major concern of healthcare professionals is that a baby born under water is at greater risk of death compared with a land birth. Death may be caused by maternal pyrexia leading to disruption of the fetal maternal thermoregulation and/or over-riding of the dive reflex leading to water aspiraton and drowning. Therefore, an important factor for the well-being of the fetus may be the maternal temperature in labour. However, it is unknown at what temperature the risk to the fetus/neonate becomes critical. The research into this area has mainly involved experiments with animals. Only one very small study has specifically examined

the maternal temperature during water immersion. Geissbuehler et al. (2002) found that the only difference between the temperatures of 30 women having a waterbirth and 17 women having a conventional birth was a higher mean maternal temperature at birth for the waterbirth group (36.9^0C vs 36.3^0C). However, this did not affect the neonate temperature because no difference was found between the two groups. Geissbuhler et al. (2002) concluded that, if women remain apyrexial, they are able to decide the appropriate water temperature for themselves. They claim that the mother has protective processes and enforcing strict guidelines for water temperatures may be detrimental to the protective physiological processes (Geissbuhler et al. 2002). Therefore, the temperature of the birthing pool may also be an important factor for maternal pyrexia and neonatal complications but few studies provide detailed information about temperatures. Despite this, there are various guidelines which recommend different temperature ranges (Anderson, 2004), which causes confusion and uncertainty as these guidelines are based on professional opinion only. Reassuringly, one large national survey (Gilbert & Tookey, 1999) analysed 4032 waterbirths and found that perinatal mortality following a waterbirth was 1.2 per 1000, similar to a conventional low-risk birth, and concluded that perinatal mortality is not substantially higher for babies born in water than for babies born to low-risk women who delivered on land. To obtain greater information about the risk of rare adverse events, such as neonatal death or water aspiration, a large study would be required.

It has been suggested that a baby born in water, which could be contaminated by maternal faeces, is at greater risk of infection compared with a land birth (Rawal et al., 1994; Vochem et al., 2001). Another anxiety is that the warm water may encourage bacteria to multiply (Zanetti-Daellenbach et al. 2007). However, no vaginal delivery is carried out in aseptic conditions because the neonate comes into contact with maternal commensal bacteria (Zanetti-Daellenbach et al., 2007). These are thought to initiate the neonatal defence mechanisms against non-beneficial bacteria and so act as a protective system for the newborn (Joseph & Singh, 2010; Langhendries, 2005; Renz-Polster et al., 2005) although this has been questioned (Park et al., 2010). However, there is also the risk of bacteria in stagnant water (*Pseudomonas aeruginosa, Legionella pneumophilia*) (Zanetti-Daellenbach et al., 2007) and neonatal swabs have also cultured the same bacteria (Brown, 1998). Precautions, such as running the taps daily to clear stagnant water from the pipes, can be taken to minimise water contamination by *Pseudomonas aeruginosa* (Robb et al., 1991). Minor neonatal infections such as conjunctivitis have been observed (Zanetti-Daellenbach et al., 2007) and sticky cords (Hawkins, 1995) but others have found no increased risk of infection compared with land births (Garland, 2007; Zanetti-Daellenbach et al., 2007; Fehervary et al., 2004; Geissbuhler & Eberhard, 2000; Gilbert & Tookey, 1999). In fact, it has been noticed that although pool water samples have been contaminated, the baby does not appear to be colonised by the same bacteria. This suggests that the water may provide a 'wash out' effect, so actually lessening the risk of neonatal infection (Zanetti-Daellenbach et al., 2006b; Thoni et al., 2005). A major waterbirth survey (Gilbert & Tookey, 1999) concluded that

they were unable to confirm or dismiss the anxieties about infection. Therefore the concern whether waterbirths increase the risk of infection for the neonate remains unresolved and requires further investigation.

Another anxiety is the risk of the umbilical cord snapping (Gilbert & Tookey, 1999; Cro & Preston, 2002; Rosenthal, 1991). Midwives normally bring the baby to the surface of the water within a few seconds of the birth so it is important to take care to prevent the umbilical cord from tearing. It should then be checked to ensure it remains intact. If a torn cord is undetected, the baby can quickly deteriorate and need a transfusion (Rosenthal, 1991). This incident can also occur at a land birth but is more likely to be recognised immediately because the cord and blood loss are visible. Whether there is a greater incidence following a waterbirth is unclear and therefore requires further investigation.

If there are concerns about a baby at birth, it may be admitted to a NICU. There was no evidence from this review that babies born in water are more likely to be admitted (Otigbah et al., 2000; Zanetti-Daellenbach et al., 2007; Gilbert & Tookey, 1999; Aird et al., 1997). However, Gilbert & Tookey (1999) warn that, with retrospective data collection, there may be underreporting of admissions. There have been NICU admissions reported for various conditions: transient tachypnoea, pneumonia, meconium aspirate, stridor, chromosomal abnormality (Gilbert & Tookey, 1999; Rosenthal, 1991). A land birth can also be associated with many of these negative outcomes. There is also evidence that paediatricians may have a lower threshold for admitting a waterbirth baby to

NICU (Rosenthal, 1991). Unfortunately, in most studies there is limited explanation provided to distinguish conditions linked specifically to waterbirths which would not have occurred if the baby had been born on land so further investigation is required.

There has been one report of severe polycythaemia in a neonate following a prolonged physiological third stage of labour in water (Austin et al. 1997). Other cases of polycythaemia and hyperbilirubinaemia were recorded by researchers (Forde et al., 1999; Fehervary et al., 2004). To prevent this occurrence, Odent (1998) has suggested that the cord should be clamped after four to five minutes. However, hyperbilirubinaemia can also occur following a land birth (Fehervary et al., 2004). It remains unclear whether a baby born in water is at increased risk of polycythaemia and, because it is a rare event, a large study would again be required to address this concern.

One contentious area is the accurate way to assess a neonate's condition at birth. A midwife observes the initiation of breathing but does not normally use a stop watch to record the time between birth and initiation. Likewise, the Apgar score is assessed at one, five and ten minutes after birth but, at a straightforward birth, the score may not be performed at precisely the correct time. When investigating Apgar scores, many studies found no difference for waterbirth babies compared with land births (Chaichian et al, 2009; Zanetti-Daellenbach et al., 2007; Otigbah et al., 2000). However, Ros (2009) observed higher Apgar

scores in the waterbirth group. As many of the studies used retrospective data collection methods, the scores provided may not be accurate. There has also been controversy as to whether the Apgar score is the appropriate method to assess the baby at birth as it does not predict long-term developmental outcomes (Nelson & Ellenberg, 1981; American Academy of Pediatrics, 1996) but the score was not designed to identify asphyxia (Papile, 2001). Although the neonate may have a high Apgar score at birth, the baby may still have suffered hypoxia in utero and this would be demonstrated by cord blood acidaemia. Many found no difference in cord arterial pH when comparing waterbirths with land births (Zanetti-Daellenbach et al, 2007; Ros, 2009; Fehevary et al. 2004; Thoni et al, 2004). However, Geissbuhler & Eberhard (2000) found that the cord arterial blood pH was statistically significant between the two groups: 7.30 after a waterbirth and 7.26 for the land birth group (p = <0.0001) which, if reliable, would indicate that waterbirths provide a beneficial effect for the neonate. When planning a research project it has to be remembered that most midwife-led units, where a large number of waterbirths occur, may not have access to the equipment required to perform blood gas analysis.

Other ways to assess the fetus and neonate are by the recording of the fetal and neonatal heart rate, breathing rate and incidence of meconium stained liquor during labour (NCCWCH, 2007). If the mother is pyrexial, this will be reflected in the fetus as fetal tachycardia (Macaulay et al., 1992) which is a sign the fetus may not be coping with labour. However, few of the studies gave information about these recordings. This may be because all observations taken from a

woman achieving a waterbirth were within normal parameters and therefore not discussed.

Only one study contacted women for longer-term follow-up (Ros, 2009). All mothers and babies were found to be healthy two weeks after the birth. However, this might be too short a time span to provide meaningful information about the possible effects a waterbirth has on the physical and neurological development of a neonate. To obtain this information longer follow-up would be required, possibly until the age of five, to assess whether a child attained developmental milestones and was academically coping with school.

This review was undertaken to obtain information about the condition of the neonate in order to inform the design of a waterbirth study. RCTs are thought to provide the 'best' and most 'rigorous' research evidence when comparing the effectiveness of one intervention with another (Polit & Beck, 2012, p. 27). Only one RCT included in the Cochrane Systematic Review (Cluett & Burns, 2009) investigated immersion during both the first and second stages of labour (Woodward & Kelly, 2004) which is reported in Chapter 3. Since publication of the systematic review there has been one additional RCT which was undertaken in Iran (Chaichian et al., 2009). This study is difficult to interpret because the authors do not adhere to the CONSORT Statement (Schulz et al., 2010) reporting requirements. Both RCTs were underpowered, which has an impact on the

validity and reliability of the results and means that any real difference between the trial arms will not be detected because statistical errors cannot be excluded.

In the absence of an adequately powered RCT, it was necessary to include methodologies which provide lower levels of evidence and therefore have the disadvantage of not being able to provide statistical significance (Polit & Beck, 2012, p. 27). However, these are the only studies which currently provide information about the effects of a waterbirth for the neonate. One method to obtain information about a specific area of interest is to collect data using a survey. The largest study investigating the effects of birth under water used this methodology (Gilbert & Tookey, 1999). An advantage of a survey is that a large group of respondents can be reached with minimal cost (Hallberg, 2008; p.180) especially if the survey uses a postal questionnaire. However, the information obtained may be superficial and the response rate may be low (Hallberg, 2008; p. 181). Gilbert and Tookey (1999) reported a good response to their postal questionnaire in the first year of data collection: of the 219 units to which a questionnaire was sent, 217 responded, providing data on 4032 births, which was 0.6% of national births during the time span. However, in the second year of data collection 13.6% fewer units provided data and it has to be remembered that submission of data was voluntary. The authors warn that data might be incomplete which has an impact on the reliability of the survey's results.

Another design other researchers chose was a retrospective case-controlled study which enables information to be obtained quickly and in a relatively cost-

effective manner by looking back in time and using medical notes or computer records (Polit & Beck, 2012, p. 224). There is a risk of bias as it may not be possible to determine whether any adverse event is due to the waterbirth intervention or is naturally occurring (Ajetunmobi 2002; p. 113). If a control group of land birth women is matched to waterbirth women it is very difficult to ensure confounding variables are eliminated (Polit & Beck, 2012, p. 224). One possible confounding variable is that participants who choose an intervention, such as a waterbirth, might be more motivated and educated than the matched controls which may influence outcomes such as the baby's condition at birth (Otigbah et al., 2000). The studies included in this review did not provide detailed characteristics of the women in control groups but Peat (2002, p. 47) states that a suitable control would be 'the next live birth' which was often the method undertaken in the studies.

Garland (2006) argues that audit is the appropriate way to evaluate waterbirths, rather than a research method, because audit supports the ethos of waterbirth care and allows reflective analysis. She also claims that by using audit women are not deprived of the choice of using a birthing pool. Garland (2002) organised a multi-centre collaborative audit which enabled more data to be collected for analysis than can be achieved from one site. A generic data collection tool was devised to ensure that consistent data were collected from each site. However, the audit still demonstrated that midwifery guidelines and practices varied between the units which impacted on the results: for example, the cervical

dilatation at which a woman could enter the pool, whether a woman who had a previous Caesarean section could enter the pool.

The non-randomised prospective study was another research method undertaken to investigate waterbirths. One disadvange of this method is that by not randomising participants bias is likely because of confounders (Polit & Beck, 2012, p. 223). However, Peat (2002, p. 59) states that this method may provide more generalisable results compared with randomisation because the 'usual' women who would take up the intervention may decline to be randomised but would participate in a study where they could choose the type of birth. Therefore this method can be used to obtain clinical information when it is difficult to conduct a RCT. This is possibly why this method has been so popular among researchers.

2.8. Conclusion

This review was undertaken to investigate the effects on the fetus and neonate of water immersion for both the first and second stages of labour and to inform an initial waterbirth research study. The review demonstrates a lack of evidence from robust research such as a RCT about the condition of a baby following a waterbirth. Generally, there is little evidence to suggest that there are definite benefits or detrimental effects for the baby. Obtaining information about the condition of the neonate is difficult because the studies tend to be small and

complications are rare. It is also difficult to compare the information provided in these studies, about the fetal and neonatal condition, because the standards which are set and the data collected vary.

Many of the concerns about waterbirths are reported in case studies and letters which focus on the negative outcomes for the neonate such as infection, aspiration, overheating or death. These are events which occur infrequently and consequently are not often picked up in small, prospective or retrospective studies. However, these rare events can occur after a routine traditional birth and are not reported, so it is unknown whether a waterbirth presents an increased risk for the neonate.

There has been one systematic review (Cluett & Burns, 2009) which examined the effect of a water immersion during childbirth for the mother, fetus/neonate and midwife, but the authors state that there were insufficient data to provide robust conclusions about the effect of maternal immersion during childbirth on the neonate. Only one RCT in the review obtained detailed information about both the first and second stages of labour (Woodward & Kelly, 2004).

The finding of this review is that there is a paucity of good quality research investigating both the first and second stage of labour in water to resolve or dismiss the concerns surrounding the fetus and neonate. The 'gold standard' of research is the RCT which would randomly allocate consenting women to a

waterbirth or a conventional land birth (Badenoch & Heneghan, 2002; p. 50). Random allocation would ensure that the neonatal outcomes are the result of the intervention (waterbirth), rather than another pre-existing characteristic as long as the sample size was large enough to provide statistical validity (Polit & Beck, 2012, p. 206).

Therefore, one way to address the lack of evidence-based knowledge about waterbirths would be to undertake a large waterbirth RCT which many have called for (Ros, 2009; Schroeter, 2004; Beake, 1999; Aird et al., 1997; Atalla & Weaver, 1995), which would provide robust information for healthcare professionals and women. Until a more scientific evaluation of waterbirths is undertaken by a RCT, there remains the danger that many healthcare professionals will dismiss waterbirths as not being a suitable option for women and, as a consequence, they will remain an 'alternative' method of care. Only when greater information has been obtained can women make an informed decision whether to use a birthing pool.

However, some researchers doubt that such a trial could be organised because of women's reluctance to participate which would mean that the large number of required recruits would be unattainable (Garcia & McCandlish, 1999; personal meeting). Midwives also have concerns about a RCT and claim it would be contrary to the ethos of a waterbirth service (Garland & Jones, 1994) and unethical because it removes the opportunity from a woman to make her own

choice (Jowitt, 2001). Another concern is whether women who agree to be randomised would be representative of the 'usual' birthing pool users and whether randomisation would have a negative impact on their childbirth experience (Garland & Jones, 1994). To answer these questions a waterbirth study was undertaken which is reported in the following two chapters.

PART 1

WATERBIRTH RANDOMISED CONTROLLED TRIAL

CHAPTER 3: WATERBIRTH RANDOMISED CONTROL TRIAL

This chapter explains the research methods used in this thesis and then describes the first study of the thesis: the waterbirth RCT to assess the feasibility of conducting a larger multi-centre trial which would be required to provide robust conclusions about the effects on the neonate. In order to achieve the aims of this thesis (detailed in Chapter 1), two studies were conducted which used research methods with different paradigms known as mixed methods. The next section will explain the difference between the paradigms and why each method was utilised.

3.1. Thesis Methods

The first study, the waterbirth RCT, used quantitative research approaches and the second study employed qualitative approaches. Using both methods is known as mixed methods (Teddlie and Tashakkori, 2009). Cresswell (2003) describes three strategies associated with mixed method studies to explain the combination or sequence of the methods: sequential procedures, concurrent procedures and transformative procedures. The strategy applied in this thesis was sequential because results from the waterbirth RCT study (reported in this chapter and Chapter 4) indicated that midwives' attitudes to waterbirths required

further exploration by a secondary study using a qualitative research method (Halcomb & Andrew, 2009).

The next section will explain the differences in the paradigms of qualitative and quantitative research methods in order to justify the need to use both methods in the thesis.

3.1.1. Differences between Quantitative and Qualitative Research Methods

Qualitative and quantitative research methods are distinguished by different paradigms. Quantitative research methods are regarded as deriving from positivist philosophy (Cresswell, 2003) which 'emphasises positive facts' and objectivity (Bowling & Ebrahim, 2005). It is championed as the 'scientific' method because quantitative researchers claim the only way to obtain valid, reliable results is by conducting experimental research which relies on 'control', and 'replication' of variables to test hypotheses (Dieppe, 2005). However, critics say that in the real world, and especially when studying behaviour, it is not possible to be so certain of the applicability of results if experimentation is used alone (Dieppe, 2005).

Qualitative research methods are regarded as deriving from a constructivist philosophy orientated to 'reconstructed understandings' and postulate that there are multiple realities rather than a single objective one (Denzin & Lincoln, 1998; Schwandt, 1998). Others say qualitative research is derived from a naturalistic belief because the research takes place in real world settings and there is no attempt to control the phenomenon which is concerned with the nature of meaning (Patton, 2002). Qualitative researchers are interested in 'capturing and communicating the participants' stories' in order to gather information and to generate findings which are helpful in explaining the issue under investigation (Patton, 2002). Qualitative research is often used for exploring areas where little knowledge exists (Teddlie & Tashakkori, 2009).

Brannen (1992) says that there are clear differences between the two methods but that the main distinction is the way each method collects and analyses data. Quantitative researchers collect numerical data in controlled situations in order to obtain valid and reliable statistical information and deduce causal inferences (Dieppe, 2005) or relationships between variables (Rees, 2003). It is usual for a large participant sample size and participants are randomly assigned to an intervention or control group (Rees, 2003). For these reasons, the results from quantitative research are thought to be generalizable to the general population (Dieppe, 2005). However, critics of quantitative research question whether the results from studies which entail control are really relevant to people in the real world (Sandall & McCandlish, 2006) and that such trials are expensive and difficult to conduct (Peat, 2002). In addition, it is difficult to understand and

explain fully the participant's experience by just producing a numerical explanation (Rees, 2003).

In contrast to quantitative researchers, qualitative researchers collect narrative data and the sampling is often purposive with a small number of participants chosen because of their knowledge of the issue of interest (Carter & Henderson, 2005). The analysis takes the form of an inductive approach because the researcher builds up a picture of the phenomenon of interest by the interpretation of emerging themes using individual elements of the narrative (Rees, 2003). It is not necessary for the research results to identify a cause and effect because the analysis of the stories collected is about understanding the subjective situation from the viewpoint of the participant, to explain the situation rather than establish a cause (Porter, 2000).

Another difference between the two methods is the relationship of the researcher with the participants and the data. The qualitative researcher has to be flexible, reflective and become immersed in the data and may have to make assumptions in order to discover and describe theories about the phenomenon (Brannen, 1992). By contrast, quantitative researchers are remote from the participants and data, often unaware to which group the participant has been allocated, and working with a pre-defined tool which allows no flexibility or reflection (Brannen, 1992).

Critics of qualitative methods claim that there is the danger that the results may not be valid or robust because of the risk of bias when choosing participants and because the researcher may select data to fit a pre-conceived idea (Paley & Lilford, 2009). However, there is support for the use of qualitative research methods in healthcare because not all aspects of clinical care lend themselves to numerical evaluation (Rees, 2003).

Recently, there have been advocates of an alternative research method which embraces both qualitative and quantitative methods to be utilised as and when appropriate during a study. This is seen as a way of resolving the conflict between the two methods (Haase & Myers, 1988). The next section will explain the philosophy behind mixed methods.

3.1.2. Mixed Method Paradigm

Patton (2002) has described mixed methods as taking 'a middle course' and having a foot in each camp. The belief of researchers using mixed methods is that no one method is capable of solving a problem and that if only one method is utilised then the research is more vulnerable to the errors associated with that method (Patton, 2002). Teddlie & Tashakkori (2009) say there are two paradigms linked with mixed methods: Pragmatism and Transformative perspective. These two beliefs reject the need to decide between either

quantitative or qualitative research methods. Instead, mixed method researchers embrace aspects of both methods to answer their research questions (Teddlie & Tashakkori, 2009) in order to gain a greater understanding of the phenomenon (Cresswell, 2003). Pragmatists do not see the real world as being clear-cut or 'an absolute unity' (Cresswell, 2003), so researchers are 'free' to decide to choose from the full array of methods. Pragmatists state that the research method depends on the question being addressed at a particular stage in the research process and that at some point in all research studies the question 'falls somewhere within the inductive-deductive research cycle' and consequently all research requires collection of both personal narrative and numerical data (Teddlie & Tashakkori, 2009). Pragmatists also challenge the idea that researchers should either be remote or immersed in the data. Instead they believe that at some point in all research studies researchers need to build a relationship with participants, but at other stages it would not be necessary (Teddlie & Tashakkori, 2009).

The next section will explain and justify the reason for using mixed methods in this thesis.

3.1.3. Reasons for Using Mixed Methods

Mixed methods were used in this thesis for pragmatic reasons. Figure 3.1. illustrates which methods were used and when in order to achieve the aims of the thesis. It has been said that using mixed methods is appropriate for health service research (Adamson, 2005). By using both quantitative and qualitative research methods in this thesis, a greater insight has been obtained about the challenges of conducting a waterbirth RCT.

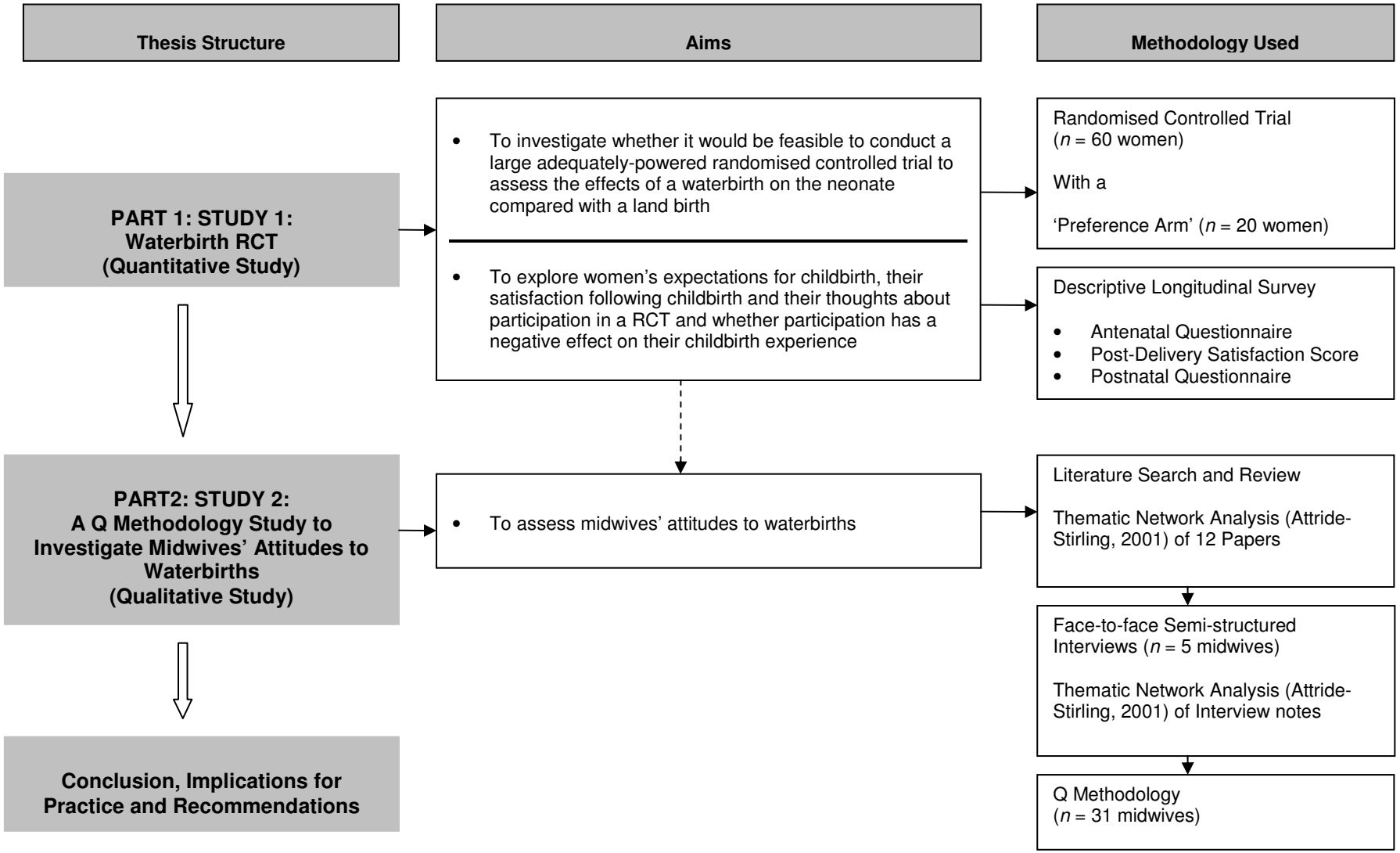


Figure 3.1: Flow Chart Illustrating the Thesis Structure, Aims of the Thesis and Methods Used

The first study in this thesis necessitated using quantitative experimental methods because the purpose was to investigate the feasibility of undertaking a waterbirth RCT to assess whether the randomisation would be acceptable to women and to confirm whether data could be collected about the condition of the baby. Therefore, it was important that the same experimental method of randomisation was followed. The study also incorporated a quantitative longitudinal, descriptive survey, using questionnaires because it was necessary to compare statistically the characteristics of women participating in the various study 'arms'.

The second study was undertaken to explore an issue about which there is little current information: midwives' attitudes to waterbirths. Therefore, a qualitative method was selected as appropriate to obtain an understanding of these attitudes. The information was gained by semi-structured interviews with 5 midwives who were purposively chosen because of their experience of the subject. Thematic network analysis of the interview notes revealed themes and their relationships which were then used to create statements for midwives to rank in a Q Methodology study. Q Methodology is suitable for exploring subjectivity.

3.1.4. Disadvantages of Using Mixed Methods

Researchers are warned about the disadvantages of using mixed methods. Andrew & Halcomb (2009) say that researchers designing a study using mixed

methods must take time to consider carefully the implications. It should be planned and undertaken carefully to ensure that the methods are utilised in such a way that the methods complement each other rather than expose their inherent weaknesses (Molina-Azorin, 2010). Andrew & Halcomb (2009) also warned that choosing such an approach may cause difficulty when writing up the results because there are two different sets of data to be reported: text and numerical. A decision has to be taken whether to combine the results or report them separately (O'Cathain, 2009). Others warn that it can be expensive and time-consuming to conduct research when using different methods (Patton, 2002).

The next sections explain the the first study reported in this thesis: a waterbirth RCT.

3.2. Waterbirth RCT

The aims are described in detail, followed by the design, ethical issues, randomisation, eligibility criteria, and recruitment process. The samples and process for data collection, and analysis will then be discussed. The chapter gives a detailed report of the work which has been published during the progress of this thesis (Woodward & Kelly, 2004; Appendix 1.).

3.2.1. Introduction

One method of pain relief that some women have chosen during childbirth is the use of warm water. However, as discussed in Chapter 2, there is little evidence available concerning the effect on the baby of delivery into water to enable women to make an informed choice. The Royal College of Obstetricians & Gynaecologists and the Royal College of Midwives (2006) have published a joint statement stating that 'all women with uncomplicated pregnancies at term should have the option of waterbirth available to them'. However, the statement also says that 'the evidence to support underwater birth is unclear' (RCOG/RCM, 2006). As demonstrated in Chapter 2 the current evidence about waterbirths has been obtained by using low level research methodologies which do not provide robust results. For some years there have been calls for scientific research evidence to be obtained before healthcare professionals endorse waterbirths (Ros, 2009; Atalla et al., 1995; Aird et al., 1997; Alderdice et al., 1995).

This study was designed to assess whether it would be feasible to attempt to organise a larger multi-centre randomised controlled trial that would be necessary to ensure statistical errors are avoided when comparing the effect on the baby of a waterbirth compared with a land birth. The study is not intended to offer, in itself, a complete answer to that question.

The MRC (MRC, 2008) guidance to researchers evaluating a complex intervention states that pilot and feasibility studies are an important stage in developing an evaluation process, which is often omitted during preparatory work, and that it may be necessary to start an evaluation with a 'series of pilot studies'. This study fulfils the 'feasibility and piloting stage' of the evaluation of a complex intervention because it aimed to test 'procedures for their acceptability', estimate 'recruitment rates' and 'retention of subjects' and to calcuate 'sample sizes' (MRC, 2008).

There is confusion about the difference between a pilot study and a feasibility study (Arain et al., 2010). It has been proposed that a definition provided by NETSCC (accessed 12 January 2012) is used for future researchers (Arain et al., 2010). This defines a feasibility study as being one which examines important issues which need to be addressed before designing the main trial: the willingness of participants to join, the willingness of clinicians to recruit participants, outcome measures for a future trial, follow-up rates and response rates for questionnaires (NETSCC, Accessed 12 January 2012). A feasibility study does not have to involve randomisation and, crucially, it does not report outcome data which have been recorded (NETSCC, Accessed 12 January 2012).

The definition of a pilot study is a trial which is a smaller version of a larger study which is planned for the future and it is undertaken to ensure recruitment,

randomisation, treatment and follow-up assessments run smoothly (NETSCC, Accessed 12 January 2012). A pilot study also reports the outcome data which can be analysed at the end of the trial and reported separately from the main trial (known as external pilot), or can be combined with the results of a future main study (known as internal pilot) (NETSCC, Accessed 12 January 2012).

The waterbirth study was designed in 1999 before discussions in scientific literature took place about the differences between a pilot and a feasibility study. As a consequence, this study evolved to include elements from both designs but should primarily be seen as a feasibility study because the requirement was to address concerns healthcare professionals expressed about undertaking a waterbirth RCT before attempting a larger multi-centre trial.

3.3. Aims

The aim of the study reported here was to assess the feasibility of undertaking a larger national randomised controlled trial which would obtain data to provide evidence concerning the effect of a waterbirth on the neonate. Odent (1997) stated that 'for obvious reasons, it is next to impossible to use prospective, randomised controlled trials in order to evaluate the benefits versus side effects of immersion during labour'. It has also been said that it may be difficult to recruit women to such a trial (Bothamley & Chadwick, 1996). Opponents of a waterbirth randomised controlled trial state that such a trial would reduce women's control over their childbirth experience and this would impact on their satisfaction with

their childbirth experience (Garland & Jones, 1994). There is currently little evidence about the health outcomes for babies following a waterbirth and the Cochrane Review (Cluett & Burns, 2009) states that the neonatal outcomes associated with waterbirth remain unevaluated and research is urgently required so that healthcare professionals are provided with information to discuss with women the risks and benefits of a waterbirth for the newborn. The issues which required assessment were:

1. Whether women would be happy to participate in a randomised controlled trial involving waterbirths. It was hoped that the study would demonstrate that women would be willing to participate in a randomised controlled trial which examines the effect of a waterbirth on a baby compared with a land birth.

2. How many women who were randomised to a waterbirth would actually deliver in the pool.

3. To test the validity of the methodology and data collection tools.

4. To obtain a sample size calculation to indicate the number of women who would need to be recruited to a future multi-centre randomised controlled trial.

3.4. Methodology

This section will explain how the study was organised and carried out.

3.4.1. Design

The design of this study was a randomised controlled trial with a 'preference arm'. A randomised controlled trial (RCT) was the experimental design of choice for this study because it was specifically undertaken to investigate whether it would be feasible to attempt a larger multi-centre RCT. It was therefore important to use the same methodology – that of randomisation. This study would act as a small scale version, done in preparation for a larger study (Polit et al.; 2001) and to test study procedures (Polit and Beck, 2012, p. 195). A larger national trial would be needed to provide substantive evidence concerning the effect on the baby of a waterbirth compared with a land birth.

Experimental research has established itself as the most widely recognised and respected approach to research within the health service, especially among the medical profession (Rees, 1997; Muir Grey, 1997). The RCT is thought to be the 'gold standard' of experimental research for determining the effectiveness of a new treatment by comparing it with current, 'normal' practice or placebo (Muir Grey, 1997). In order for an RCT to be carried out there should be genuine uncertainty, or equipoise, about whether one intervention is better than another (Muir Grey, 1997).

Cochrane (1989) stated that 'the RCT is a very beautiful technique, of wide applicability, but as with everything else there are snags'. One main 'snag' when contemplating a waterbirth RCT is that in order to measure the effects of

infrequent or rare neonatal adverse events/outcomes, a larger sample size is required to detect any difference there may be between trial groups. Another concern is that RCTs are not acceptable to women who have strong preferences to choose a waterbirth and therefore would exclude the types of women to whom the results would be subsequently applied (Peat, 2002).

Women who consented to participate in the randomised controlled trial were randomly allocated to either a waterbirth or a land birth. Because audit experience had demonstrated that approximately 50% of women who were randomised to the waterbirth arm of the trial might not deliver in the pool (Brown, 1998), it was decided to randomise at a ratio of 2:1 waterbirth to a land birth.

Opponents of a randomised controlled trial state that women would not participate in a trial which would allocate them to either a water or land birth (Jenkins, 1996). It has also been suggested that RCTs are unethical as randomisation would reduce a woman's choice and therefore affect her childbirth experience (Jowitt, 2001). Opponents also state that such a trial would not be collecting data from those women who were determined to use the pool, so may not be truly representative of that group, and therefore it would not be appropriate to generalize from the results of a future RCT (Jenkins, 1996). If the characteristics of the women who consented to be randomised did differ from the women determined to use the pool, the RCT might produce results which were not relevant to all women (LoBiondo-Wood, 1994). A decision was made to request consent to follow up women who definitely wished to use the water pool

for their birth, and women who definitely did not wish to have a waterbirth, and so would not want to participate in the randomisation procedure, in order to investigate whether they differed in their birthing outcomes (Jenkins, 1996). This was to be known as the 'preference arm' of the trial (Brewin & Bradley, 1989). If the outcomes of this group were found to be similar to the trial group, then one may predict that the trial results would apply to the general population (Fielding et al., 1999). The 'preference arm' would also allow the impact of active choice on outcomes to be assessed (Burns & Grove, 2009).

3.4.2. Setting

The trial took place in a district general hospital, in the East Midlands region of England, where 3,600 women delivered each year. The hospital had a birthing pool installed in 1998. By the time the research was undertaken, approximately 200 women annually used the pool during their labour for pain relief, and of those, approximately 100 women achieved a waterbirth (NGHT, 2000).

There were approximately 30 midwives, mainly working on the labour ward, who regularly cared for women having a waterbirth. When the study was undertaken, it was best practice in the unit for two midwives to be present at the actual waterbirth.

3.4.3. Research Ethics Committee Approval

Ethical approval was sought and obtained from the Local Research Ethics Committee prior to starting recruitment to the study (Appendix 2).

3.4.4. Consent

All women who expressed an interest in the research had an initial phone conversation with the research midwife who briefly explained the study. If the woman was interested in finding out more, a meeting was arranged, normally at her own home. Women were given a detailed information sheet (Appendix 3) explaining the reason for undertaking the research, what their participation would entail and any possible disadvantages of joining. They were given the opportunity to ask questions and delay their decision about participating.

Women were aware that participation in the study was voluntary and that they were able to withdraw from the study at any time without affecting their maternity care.

3.4.5. Randomisation Schedule

The randomisation schedule was provided by the National Perinatal Epidemiology Unit, Oxford University. A person unconnected with the study, who worked in the Trust Research and Development Department, prepared sequentially numbered, opaque envelopes containing written cards with the allocation to either 'land' or 'water'. The randomisation schedule was then sealed in an envelope and retained by the Research and Development Department. After a woman had given written consent to participate in the RCT, she opened one of the numbered randomisation envelopes. These were opened in the same, correct numerical order as the women were recruited. A Recruitment Log was maintained detailing the Participant Number, the date the woman was consented, the number of the envelope she had opened and the resulting allocation. Once the recruitment was completed, the randomisation schedule was checked by the person who had prepared the envelopes against the Recruitment Log in order to ensure that the envelopes had been opened in the correct order.

Ideally, to reduce bias for a randomised controlled trial, it would be preferable to 'blind' the participants, midwives and data analyst. Blinding means that the people involved in the trial are unaware of the randomisation allocation for as long as possible (Jadad & Enkin, 2007). However, it is acknowledged that it is not always possible to implement blinding (Schulz et al.; 1995). It would be impossible to blind women and midwives to the randomisation allocation for a

waterbirth study because of the need to be able to identify which intervention each woman was allocated in order to fulfil the trial requirements.

3.4.6. Sample Size

3.4.6.1. Randomised Arm of Trial

The aim was to recruit 60 women to the randomisation arm of the study. Forty women would be allocated to a waterbirth and 20 women allocated to a land birth. As this research project was to be a feasibility study to test the research processes, it would recruit a small number of the population from which the study sample would be drawn (Sim & Wright, 2000). It was thought that 60 participants would be adequate to judge whether women were happy to participate in a randomised controlled trial. It has been suggested that randomisation is a controversial issue in relation to consumer choice (Burke & Kilfoyle, 1995). This number would also give an indication of the percentage of babies who were actually born in the pool after their mothers were randomised to a waterbirth. It was also thought to be adequate to test the methodology and data collection tools to identify any problems before undertaking a larger multi-centre RCT.

3.4.6.2. Preference Arm of the Trial

The aim was to recruit and follow up ten women who did not wish to randomise because they definitely wanted a waterbirth. It was also hoped to recruit and follow up ten women who did not wish to be randomised because they definitely did not want a waterbirth. It was anticipated that this number of women in each group would be adequate to assess maternal expectations and satisfaction with their delivery and then to make a comparison with the women in the RCT. A 'preference arm' to the trial meant that women who expressed a strong desire to use the pool could participate without their choice being compromised (Bothamley & Chadwick, 1996).

3.4.7. Selection Criteria

3.4.7.1. Inclusion Criteria

Women were eligible to join the study if they were aged between 18 and 50 years of age, had no complications during their pregnancy and no envisaged problems for labour and delivery.

3.4.7.2. Exclusion Criteria

Women were excluded from the trial if:

- labour occurred before 37 weeks of gestation
- they have had a previous delivery by caesarean section
- there was confirmed intrauterine growth restriction
- there was a medical condition which excluded use of the pool
- there was a pregnancy complication/condition which excluded use of the pool

3.4.8. Data Collection

Tables 3.1. and 3.2. provide information on the data and samples which were obtained for analysis. The majority of the data were collected from the maternity and neonatal birth records.

Table 3.1: Illustrates the Maternal Data and Birthing Pool Data Collected.

Maternal and Fetal Data

- Demographic data
  - Age
  - Social history
  - Medical/surgical history
  - Obstetric history
- Length of first and second stage of labour
- Length of time of rupture of membranes prior to delivery and whether spontaneous or artificial
- Hourly maternal temperature and half-hourly pulse in labour
- Intermittent auscultation of the fetal heart rate in labour – every 30 minutes during first stage and every 5 minutes during second stage
- Whether labour was augmented
- Types of analgesia used in labour
- Method of delivery and indication for any instrumental or surgical intervention
- Management of the third stage of labour – whether physiological or active management
- Condition of perineum after delivery
- Length of time in the water
- Maternal satisfaction with the birthing experience immediately after the birth
- Maternal expectation and satisfaction with outcome of labour and the birth
- Maternal thoughts about study participation

Birthing Pool Data and Samples

- Hourly temperature of the water
- Observation for signs of meconium
- Observation for signs of faeces
- Sample of pool water before pool use for microbiological analysis
- Sample of pool water after birth, or when the woman left the pool for microbiological analysis

Table 3.2. Illustrates the Data Obtained to Assess the Condition of the Neonate

Neonatal Data

- Cord blood for:
  - pH – arterial and venous
  - cord haemoglobin
  - packed cell volume
- Apgar score:
  - At 1, 5, and 10 minutes
- Time to first respiration
- Incidence of torn cord
- Rectal temperature at birth
- Swabs, for culture and sensitivity, from:
  - Umbilical cord
  - Ear
  - Mouth
- Admission to Special Care Baby Unit/Neonatal Intensive Care and interventions undertaken
- Neonatal jaundice requiring treatment
- Method of feeding
- Date and time of first feed
- Incidence of infection requiring antibiotic treatment
- Length of hospital stay after birth (if applicable)
- Condition of neonate six weeks after birth and any problems since birth
- Mortality

3.4.9. Maternal Expectation and Satisfaction Questionnaires

Women were asked to complete three waterbirth study questionnaires. The first when they joined the study, the second soon after the birth and the final one six weeks after the birth. The questionnaires are discussed in greater detail in Chapter 4.

3.4.10. Analysis of Samples

3.4.10.1. Pool Water

The water samples were analysed in the microbiological department using microscopy, culture and sensitivity.

3.4.10.2. Cord Blood

Paired samples, one from the umbilical artery and another from the umbilical vein, were obtained using heparinised syringes (to prevent the blood sample from clotting) for acid-base measurement. Samples were analysed using the blood gas analyser in the Neonatal Intensive Care Unit.

Another sample of cord blood was obtained, and sent to the haematology department for a cord haemoglobin and packed cell volume measurement.

3.4.10.3. Neonate swabs

When the paediatricians were informed about the swabs samples which were to be obtained from neonates, they had concerns about babies being treated unnecessarily if the results were circulated to General Practitioners (GPs) and midwives. It was agreed, following discussions with the paediatricians and a microbiologist, that the samples would be labelled as waterbirth study research samples. The reports would only be sent to the researcher. The researcher had contact with a paediatrician for advice if there were concerns that any bacteria cultivated might affect the health of the neonate.

3.5. Equipment

3.5.1. Birthing Pools

The hospital birthing pool used by women was an Active Birthing Pool which is a free-standing, plumbed-in birthing pool obtained from the company Active Birthing Pool Limited, London.

One woman did have a home waterbirth. She had obtained a Pool in a Box, PVC birthing pool which was provided by the Good Birthing Company.

3.5.2. Digital Water and Room Thermometer

A digital display water thermometer (rs-online.com) was used to measure the water temperature using a water submersible probe which was maintained about a foot from the bottom of the pool. The room temperature was also measured by the device.

3.5.3. Waterproof Fetal Sonicaid

The fetal heart rate was monitored using a Huntleigh hand-held waterproof fetal sonicaid.

3.5.4. Maternal and Neonatal Temperature

The maternal temperature was measured by using a Genius aural thermometer which was purchased specifically for the trial participants to ensure that consistent readings were obtained.

The neonatal rectal temperature was recorded using a mercury thermometer, which was standard practice when the research was conducted.

3.5.5. Stop Watch and Timer

To ensure that the time to first breath was obtained accurately, a sports watch (Saxon Chronograph) was purchased using the research funding. The stop watch was also used to record the one minute Apgar Score.

A separate alarm clock (Lincoln Quartz) was purchased to time the recordings for the five and ten minute Apgar Scores. The time alarms were preset prior to the birth.

As soon as the baby was completely born, the stop watch and the alarm clock were started. When the baby took its first breath, the stop watch was pressed once to record the number of seconds from birth. The midwife continued to watch the digital display to time when 60 seconds had passed in order to assess the one minute Apgar Score. When the clock alarmed at 5 minutes the Apgar Score was reassessed and again at the10 minutes alarm.

3.6. Waterbirth and Research Training for Midwives

Waterbirth training sessions were arranged in order to increase the number of midwives who were proficient and confident when supporting women having a waterbirth. Midwives who were experienced in undertaking waterbirths were asked to encourage and mentor other midwives.

Once the study procedures and paperwork had been finalised and ethical approval had been obtained, specific training sessions for midwives were organised to explain the research process and how to obtain the data and samples required. This was necessary in order to ensure that midwives providing care to participants and obtaining samples understood the need for accurate data and to ensure that trial procedures were standardised.

Before the study was conducted, many midwives were not accustomed to taking cord bloods. The researcher demonstrated during the training sessions how to obtain the blood. She also visited the Labour Ward regularly, before recruitment started, to observe midwives carrying out the procedure. To aid data collection, a manual (Appendix 4) was produced detailing the study procedures and how to use the equipment.

3.7. Data collection packs

To reduce the paperwork required, individual named packs for each woman were made up by the researcher containing:

- the microbiology swabs
- haematology bottles
- water containers
- maternal satisfaction questionnaire and envelope
- Data collection check list: Water allocation (Appendix 5) or Land Allocation (Appendix 6)

The envelopes contained the appropriate check list for each woman so that midwives could confirm the samples they had obtained and/or record any difficulties they had collecting samples. All the sample container labels and the paperwork were completed by the researcher. This meant that the midwife obtaining the sample was only required to complete the date and time once the samples were collected. The packs were kept, with the equipment required to collect the data, in a large enclosed plastic box in the Labour Ward. The packs were produced because midwives within the maternity unit voiced concerns that the obtaining of additional data required for the study would increase their workload at a time when it was acknowledged that the unit was short of midwives (Washbrook, 2002).

A copy of the study procedures manual and the waterbirth guidelines were also kept in the box in case a midwife needed them. When a participant was admitted in labour, the midwife providing care would collect the appropriate pack.

To make sure that the required data were collected from women participating in the trial, and to ensure that women allocated to the birthing pool were able to use the pool, four midwives experienced in waterbirth volunteered to be on-call to collect the data when there were insufficient midwives on duty and to support midwives who were less experienced in conducting waterbirths.

At the time when the study was undertaken, GPs were often the first person a woman contacted when she found she was pregnant, and as they often saw women during pregnancy, it was decided that it would be important for GPs to be aware that the study was due to start. The Chair of the General Practitioner Liaison Committee was informed and he agreed to circulate the study protocol to members of the Committee and report back if any issues were raised. No concerns were fed back to the researcher.

As it is important to involve users of maternity services in research (DH, 2010), the researcher attended a meeting of the Maternity Services Liaison Committee to inform members about the study and this gave a chance for further discussion. The lay representatives were interested and supportive of the study.

3.8. The Study Process

3.8.1. Recruitment of Women

Women were recruited to the study between 36 – 41 weeks of pregnancy. Three time periods were considered for recruitment. The options discussed were that women could be recruited at the beginning of pregnancy, towards the end of pregnancy or when they were in labour.

Recruitment at the beginning of pregnancy was ruled out because it was decided that too many women may develop complications during their pregnancy which would mean they would be unable to achieve a waterbirth. There is also a great deal of information given to women at the beginning of their pregnancy and it was feared that women might not be interested in talking about the birth so early in pregnancy. Another anxiety was that women might change their mind about recruitment later in pregnancy, especially as they started to think about the different methods of pain relief as their pregnancy progressed.

Recruitment at the beginning of labour was rejected because was decided that it would be difficult to discuss a research project and obtain informed consent when a woman was in labour, might be requesting pain relief, finding it difficult to concentrate and there was limited time to consider the information given (Jones, 2000). Another reason for the decision not to recruit during labour was that it was

felt to be desirable that a woman should know whether she would be able to use the pool prior to the start of her labour. This knowledge would mean that she would be able to consider alternative methods to cope with the contractions should she be randomised to a land birth.

Women invited to join the 'preference arm' of the study were recruited at the same gestation as the women recruited to the RCT arm to ensure uniformity between study arms.

3.8.2. Information and Consent Process

Potential participants were identified by community midwives at the 36 week antenatal appointment and verbal consent was obtained by the community midwife to pass contact details to the researcher. The community midwife gave a Participant Information Sheet (Appendix 3) to the woman. Once the researcher received the referral, she contacted the woman by phone to discuss the study and check eligibility. If the woman was eligible and wanted to talk about participating, an appointment was made to meet the potential recruit in her home or another location convenient for the woman. Plenty of time was given for the woman to ask questions.

Once a woman decided to participate, she signed the consent form (Appendix 7 & 8) and completed a questionnaire (Appendix 9) which asked about her expectations and aspirations for her labour. Once this questionnaire was completed, the woman was given the randomisation envelope to open herself to ascertain whether she was allocated to a waterbirth or a land birth. It was thought that if the woman opened the envelope herself, and informed the researcher of her allocation, it would give her a greater sense of control and counteract the concerns midwives expressed about reducing control and choice for women.

A copy of the consent form was given to the woman, a second copy was placed in her maternity records and a third copy was retained by the researcher. The researcher then documented in the woman's hand-held maternity records that she was participating in the study and to which trial arm she was allocated. A sticker was designed for the waterbirth study to help identify women participating in the study. This sticker was placed on the front of the woman's hand-held notes with the word 'water' or 'land' as appropriate. A letter (Appendix 10) was sent to the woman's GP and midwife to inform them of her participation in the study.

Initially, it was hoped that women would be recruited at an adequate rate by referrals from community midwives. To enhance recruitment, posters were placed in antenatal clinics to maintain awareness among staff and inform pregnant women about the trial. Women who saw the posters and were

interested either contacted the researcher themselves or gave permission to their community midwife, obstetrician or GP for their contact details to be given to the researcher.

However, because the number of referrals from community midwives and obstetricians was lower than expected, permission was sought, and obtained, from the hospital's Medical Research Ethics Committee to obtain publicity for the trial. The local newspaper was approached to write a feature about the study and this article then prompted the local radio and television to request interviews with the researcher.

3.8.3. Process during Labour

When a recruit was admitted to Labour Ward, the midwifery care was provided according to the usual Trust guidelines and procedures. However, there were differences in the midwifery care for women having a waterbirth compared with a traditional land birth. The main deviation from normal midwifery land birth care was that once a woman entered the pool it was standard practice in the Trust to have one midwife with the woman at all times. It was recognised as important to try and provide the same midwifery presence for women randomised to a land birth. The aim was that one midwife should be present during her labour at all times, to match the care provided for women who were allocated to the pool.

Women who were allocated to a land birth were encouraged to mobilise during their labour.

The midwife obtained the woman's study pack, and any additional equipment she required from the box.

3.8.3.1. Maternal Temperature

At the time the research study was undertaken the maternal pulse was recorded every 30 minutes during labour and the maternal temperature was recorded four-hourly for women having a traditional land birth. When women used the birthing pool the maternal temperature was recorded hourly. As the maternal temperature is an important aspect of fetal-maternal thermoregulation it was decided to request that the maternal temperature was also recorded hourly for women having a land birth to obtain regular recordings from all participants.

3.8.3.2. First Pool Water Sample

Before the birthing pool was filled with water, the taps were run for five minutes to clear any stagnant water from the pipes to reduce the risk of water contamination with *Pseudomonas aeruginosa* (Robb, et. al.,1991). When the pool was filled, a

sample of the pool water was obtained from the centre of the pool for laboratory analysis. The woman was then able to enter the pool.

3.8.3.3. Water Temperature

The Trust waterbirth guideline recommended that the water temperature was to be measured hourly during the first stage of labour and should be maintained at a temperature at which the mother felt comfortable (NGH, 1998). During the second stage of labour, the water temperature was to be measured every 15 minutes and maintained between 37^0 – 37.5^0C because it is felt that this temperature range would prevent initiation of respiration of the newborn while under the water (Johnson, 1996). The water was to be observed for signs of meconium and, if this was suspected, the woman was asked to leave the pool for further investigation. Any contamination of the pool water by faeces was cleared using a plastic sieve. If a woman left the pool, midwives should record in the maternity records the time she exited the pool and the time she re-entered it to obtain accurate immersion time.

3.8.3.4. Pool Room Temperature

The pool room temperature was recorded hourly. A bowl of iced water and a flannel was provided in case a woman began to feel hot in the pool. The flannel

was used as a cold compress on her forehead or shoulders (Garland, 2000). A jug of iced water was available for women to drink to prevent dehydration.

3.8.3.5. Fetal Heart Rate Recording

An underwater sonicaid was used to monitor the fetal heart rate intermittently as per the Trust guidelines when the study was carried out: every 30 minutes during the first stage of labour, after every contraction during the second stage of labour (NGH, 1999).

3.8.4. Birth

There were two midwives present during the actual birth (NGH, 1998). The second midwife was able to use the stop watch and timer to obtain the time to first breath and the timed Apgar Scores.

Waterbirth: The Trust procedure for the birth is that midwives do not feel for a nuchal cord, and a hands-off technique is employed as this is thought to lower the chance of the baby breathing while under the water (NGH, 1998). The baby is then lifted by the midwife or woman to the surface of the water.

3.8.4.1. Cord Blood Samples

The cord was double clamped, as soon as the baby was born or lifted to the surface, to obtain the cord blood samples once the placenta was delivered.

3.8.4.2. Neonatal Swabs

Land birth: The neonatal swabs were obtained while the mother was holding the baby soon after the birth before the baby fed.

Waterbirth: The neonatal oral and ear swabs were obtained while the mother was holding the baby soon after it was brought to the surface. The umbilical swab was obtained when the baby was removed from the pool.

3.8.4.3. Second Water Sample

The post delivery pool water sample was obtained, from the centre of the pool, once the mother left the water. If a woman left the pool before the birth, the water sample was obtained when she exited the pool.

3.8.4.4. Maternal Satisfaction Score

The woman recorded her satisfaction score before leaving the labour ward (Appendix 11). If a home birth, the score was recorded before the midwife departed (Chapter 4).

3.8.5. Postnatal Process

Just before the baby was six weeks of age the woman was sent, by post, the postnatal questionnaire (Appendix 12) to complete together with a stamped addressed envelope to return it to the researcher (Chapter 4).

3.9. Analysis

Statistical analysis was performed using Statistical Analysis for Social Scientists (SPSS version 10, SPSS, UK, Woking, 1999). Analysis of the randomised arm of the trial was undertaken on an 'intention-to-treat' basis. Means were compared using independent sample t test or Mann-Whitney U test/Wilcoxen's signed rank test. Nominal data were compared using x^2 or Fisher's Exact Test.

The ‘preference arm’ of the trial was then compared with the randomised arm by one way between subjects ANOVA for continuous measurements and Kruskal-Wallis test for non-parametric data.

3.10. Results

This section explains the research findings. Recruitment and data collection were completed 15 months after commencement of advertising the study.

3.10.1. Recruitment

Recruitment was carried out over 11 months. Sixty women were randomised and 20 women joined the ‘preference arm’. As this was a small study, with limited funding, information was not collected concerning how many women were aware of the project or how many women were eligible to join the study during the recruitment period. A total of 148 women discussed the project with the researcher. The reasons why 68 women did not join are provided in Figure 3.2.

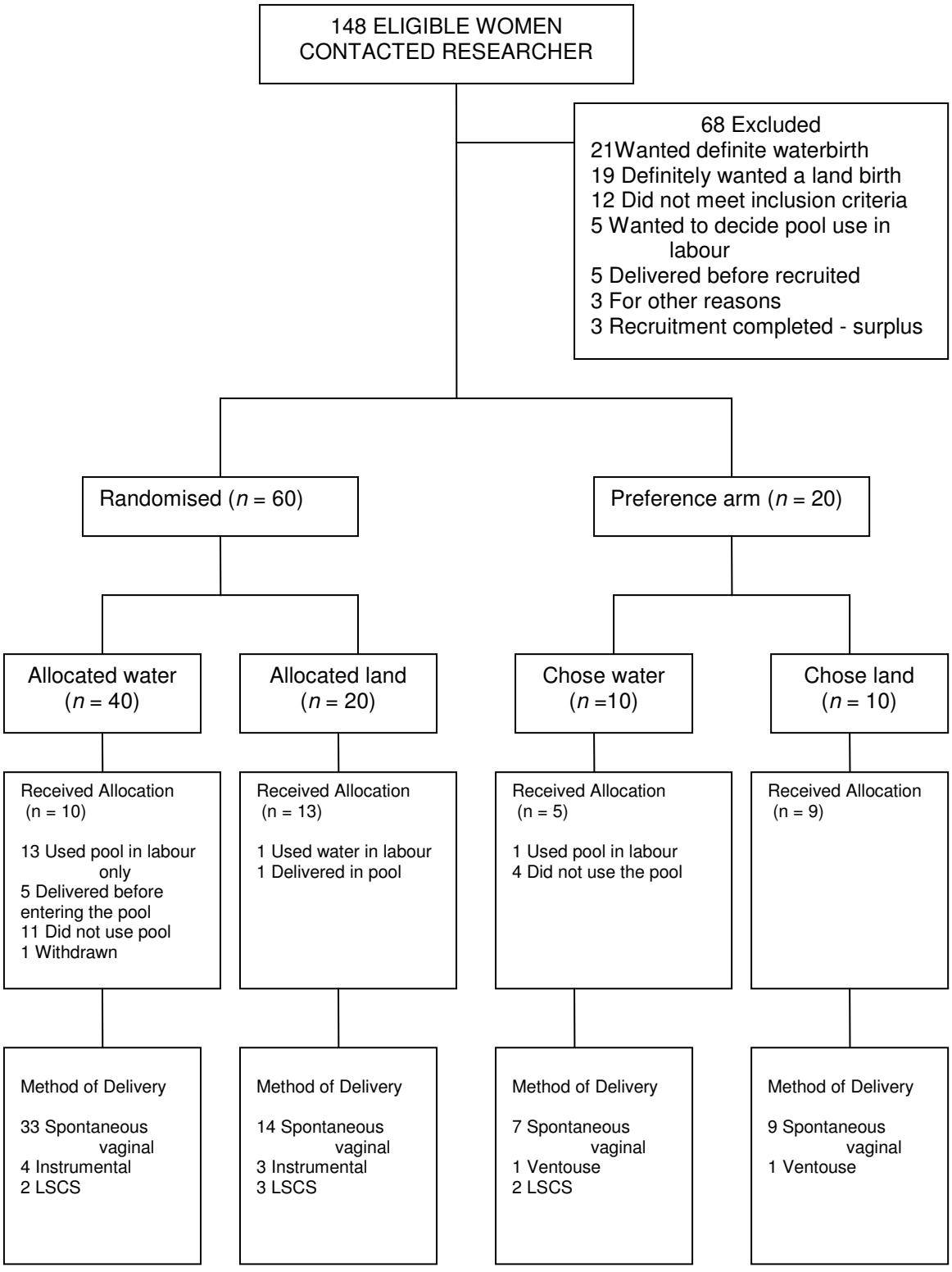
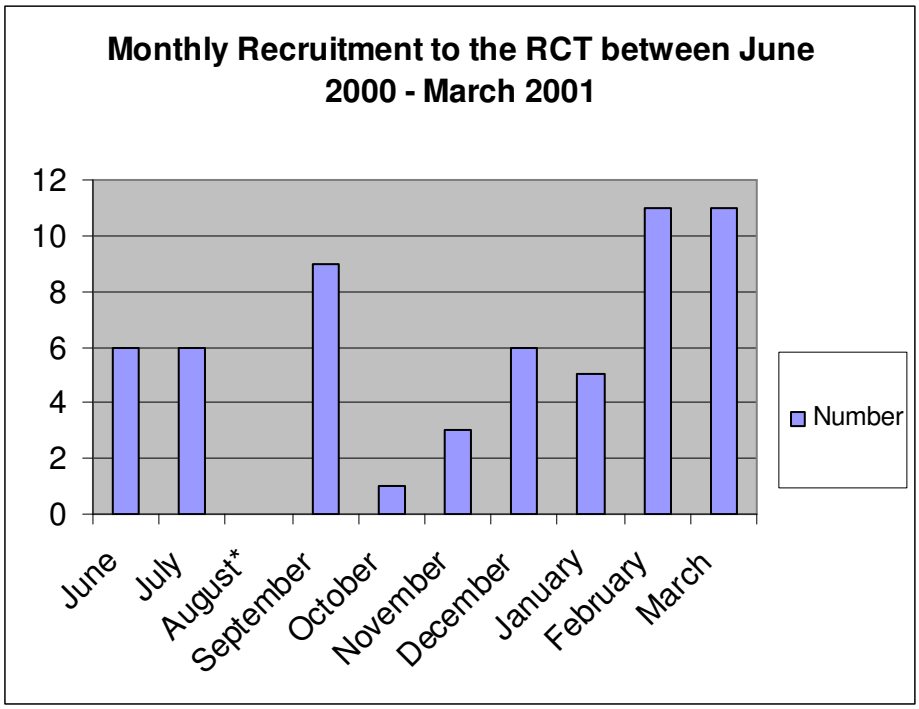


Figure 3.2: Flow Diagram of Trial Participants

To randomise 60 women took ten months (Figure 3.3). For one month during this period recruitment was stopped due to the researcher's holiday commitments. For each of the last two months of the recruitment period, 11 women joined. If this rate of recruitment had been achieved at an earlier stage it would have taken about six months to find 60 participants. However, this was the first midwifery research project undertaken in the unit, so it was anticipated that recruitment would be slow initially until midwives became accustomed to explaining the project to women.

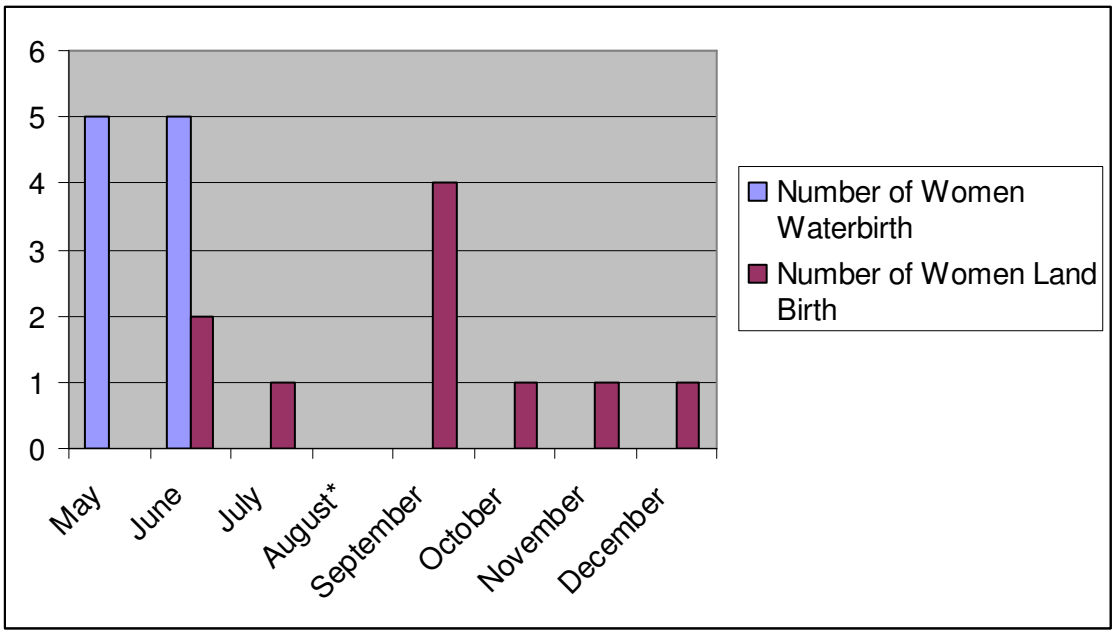


* Holiday commitment – no recruitment

Figure 3.3: Illustrates the Number of Women Recruited Each Month to the Randomised Arm

The recruitment to the 'preference arm' of the trial was started before women were randomised (Figure 3.4). By doing this, it was possible to test the data

collection methods, and iron out any problems, before women were recruited to the RCT arm of the study. Recruitment to the waterbirth 'preference arm' was completed within two months. However, it took eight months to find ten women willing to join the land birth 'preference arm' of the trial.



* Holiday commitment – no recruitment

Figure 3.4: Illustrates the Number of Women Recruited Each Month to the 'Preference Arm'

3.10.2. Compliance with Randomisation Schedule

The next section will explain how many women actually achieved the allocated waterbirth or straightforward normal land birth in each of the trial arms.

3.10.2.1. Randomised to Water

To be eligible to use the pool, women have to be in spontaneous labour, with no anticipated problems for labour or delivery. On admission to the labour ward women randomised to a waterbirth were reassessed by the clinical midwife providing care, to ensure that they were still suitable to use the pool. Seventeen (42.5%) women who were randomised to the pool did not actually use it for their labour or their baby's birth (Table 3.3). The majority of women (*n* = 7) could not use it as they had meconium stained liquor. Unfortunately, because the pool takes 20 minutes to fill five women (12.5%) were unable to use it because their labour progressed too rapidly. Five other women could not use the pool because they had pre-labour or prolonged rupture of their membranes. As there are concerns about an increased risk of infection for the baby when membranes have been ruptured for more than 18 hours before birth, and anxiety about risk of infection with a waterbirth, such women (who have prolonged ruptured membranes) are not eligible to use the pool. One woman, who was randomised to water, was withdrawn from the study as the midwife caring for her felt that she was too distressed to discuss use of the pool because of the pain of labour even though she had discussed waterbirths at length with the research midwife prior to labour, and had given her consent to join. The labour ward midwife suggested to the woman that she had an epidural, an option she agreed to accept, although there was not much time to discuss the advantages and disadvantages of an epidural because the woman delivered after an hour of arriving on the labour ward, soon after the epidural was administered.

Twenty-three (57.5%) women who randomised to water actually used the pool for pain relief during labour. Thirteen (32.5%) of these women left the pool during their labour. The major reason that women left the pool (*n* = 5) was because their labour failed to progress at the expected rate. Three women found that they required stronger pain relief and two women were found to have meconium stained labour liquor when their membranes ruptured, so had to leave the pool for the safety of their baby. Ten women achieved a waterbirth out of a possible 40 women randomised to a waterbirth.

3.10.2.2. Randomised to Land

One woman randomised to a land birth used water during the first stage of labour to help her cope with contractions while at home. Another woman randomised to a land birth actually achieved a waterbirth because of a misunderstanding on the part of the midwife providing care.

3.10.3. Compliance with the 'Preference Arm' Allocation

Five women (50%) in the 'preference arm' achieved a waterbirth. One woman used the pool for labour but left before delivery because her labour was not progressing at an appropriate rate. The reasons for the women not entering the pool are shown in Table 3.3.

Table 3.3: Reasons Why Women in the RCT Arm and the 'Preference Arm' Did Not Use thePool (Information obtained from midwifery documentation).

Reasons for women not using the pool *	**RCT Waterbirth Arm** (*n* = 17)	**Water 'preference Arm** (*n* = 4)
Meconium stained liquor	7	1
Pre-labour/prolonged rupture membranes	4	0
Raised blood pressure on admission	3	0
Delivered before entered pool	5	1
Pool unavailable	2	0
Undiagnosed breech	1	1
Induced	2	0
Fetal distress on admission	1	1
Did not want to use pool when in labour	1	0
Maternal pyrexia at start of labour	1	0
Maternal HVS cultured GBS prior to labour	2	0
Maternal vulval warts noticed in labour – midwife felt inappropriate for mother to use pool	1	0
Reasons for women leaving the pool before the birth *	*n* = 13	*n* = 1
Failure to progress in labour	5	1
Requested more pain relief	3	0
Meconium-stained liquor	2	0
Not comfortable in the pool	2	0
Left pool for assessment – cervix fully dilated and did not want to re-enter the pool	1	0

* May be more than one reason per woman

3.10.4. Women's Baseline Characteristics: RCT

When comparing the baseline characteristics of the women who randomised, there are no statistically significant differences when comparing professional qualification and age at delivery between the two groups (Table 3.4). However, there was a statistically significant difference in age of leaving full-time education with a mean leaving age of 17.2 years for women randomised to water compared with 18.5 years for those in the control group ($p = 0.05$).

Table 3.4: Characteristics of the women at trial entry. Values are given as *n* (%), mean [SD]

	Randomised Arm		RCT *p* value	'Preference Arm'		ANOVA
	Water *n* = 40	Land *n* = 20		Water *n* = 10	Land *n* = 10	
Age left full time education (years)	17.2 [1.6]	18.5 [2.6]	0.05	18.0 [2.2]	18.2 [2.9]	0.12
Professional qualifications (*n*)	9 (23)	9 (45)	0.13	8 (50)	4 (40)	0.19
Age at delivery (years)	28.4 [5.4]	28.7 [4.2]	0.84	29.5 [4.5]	27.9 [4.7]	0.90
Primiparous (*n*)	24 (60)	15 (75)	0.39	5 (50)	5 (50)	
Gestation (completed weeks)	39 [1.1]	39 [1.1]		39 [0.6]	39 [1.0]	
Ethnicity (*n*)						
White	39 (98)	19 (95)		9 (90)	9 (90)	
Black	1 (2)	1 (5)		1 (10)	1 (10)	

3.10.5. Women's Outcomes: RCT

Thirty-three women (84.6%) who were randomised to water achieved a normal vaginal delivery compared with 14 (70%) of those in the control group. There was a higher percentage of instrumental deliveries in the control group (15%) compared with 10% in the waterbirth group (p = 0.68). There were also more caesarean sections in the land birth arm: three (15%) compared with two (5%) in the waterbirth group (p = 0.38). There were no statistically significant differences for maternal temperature, length of labour or other outcomes.

Labour complications were experienced by 23 (57.5%) of the waterbirth women compared with 12 (60%) of the women delivering on land (x^2 = 0.34, df = 2, p = 0.85). There was no significant difference between the length of first stage of labour or second stage of labour when comparing the groups. The maternal temperature during labour was monitored hourly for both arms of the trial because there are concerns that a woman's temperature may rise due to her being immersed in warm water for a period of time. The maximum recorded maternal temperature for women randomised to a waterbirth was 38^0C compared with 37.6^0C for the control group. There was no statistically significant difference in maternal temperature during labour – mean temperature 36.9^0C (SD 0.468) in the waterbirth arm compared with 36.7^0C (SD 0.795) in the control group (p = 0.75).

The women randomised to land used a greater variety of analgesia than women randomised to water (Table 3.5). Four (10%) of the waterbirth arm had no pain relief, other than water, compared with one (5%) land birth woman ($p = 0.18$).

Six women (30%) in the land birth arm had an intact perineum compared with nine women (22.5%) randomised to water ($x^2 = 0.40$, df = 1, $p = 0.54$). Nine (22.5%) of the women in the waterbirth arm had an episiotomy (these women did not deliver in the pool) compared with six (30%) in the land birth group ($p = 0.53$). There was one third degree perineal tear in the group randomised to a waterbirth versus none in the land birth arm.

Table 3.5: Women's Outcomes: Randomised Arm. Values are given as *n* (%) or mean [SD].

	Random Allocation		*P*
	Water	Land	
Length of first stage (minutes)	420.8 [225.4]	409.4 [265.0]	0.87
Length of second stage (minutes)	47.3 [46.8]	58.7 [44.3]	0.38
Method of delivery			
Spontaneous vaginal	34 (85)	14 (70)	0.17
Forceps/ventouse	4 (10)	3 (15)	0.68
Caesarean section	2 (5)	3 (15)	0.38
Analgesia			
Water	21 (55)	2 (10)	
Entonox	33 (83)	14 (70)	
Meptazinol	7 (18)	4 (20)	
Pethidine	2 (5)	5 (25)	
TENS	3 (8)	2 (10)	
Epidural	6 (15)	7 (35)	
None (except water)	4 (10)	1 (5)	
Maternal temperature (^{0}C)	36.9 [0.5]	36.7 [0.8]	0.72
Length of time in pool (minutes)	146 [133]		
Perineum			
Intact	9 (23)	6 (30)	0.54
Episiotomy	9 (23)*	6 (30)	
Labial tear	5 (13)	3 (15)	
Vaginal tear	2 (5)	0	
First degree tear	7 (18)	2 (10)	
Second degree tear	8 (20)	3 (15)	
Third degree tear	1 (3)	0	
Maternal satisfaction +	4.32 [1.20]	4.29 [1.26]	0.94

* Did not deliver in the pool

+ Measured on a scale of 0 – 6 (*0 = not at all satisfied, 6 = extremely satisfied*)

3.10.6. Outcomes for the Neonate: RCT

There was no statistical difference between the two groups regarding gestation at birth, weight, head circumference or length of the babies. The median time to first breath was 6.1 seconds for babies born in water compared with 4.5 seconds for those born on land ($z = 0.530$; $p = 0.60$).

Four (10%) of the babies in the waterbirth group had one minute Apgar scores of < 7 compared with one (5%) in the land birth group (NS $p = 0.1$). The median Apgar score at one minute was 8 for both the water and land birth group. The five minute Apgar score is a more accurate assessment of fetal condition. There was one waterbirth arm baby with an Apgar score of < 7. This baby had an arterial cord pH of 7.14 and base excess – 17.00 mmol/L. The baby responded well to resuscitation and was not admitted to the neonatal unit. The median Apgar score at five minutes was 9 for both groups. At 10 minutes all the babies had an Apgar score of 10, except one in the waterbirth arm (with an Apgar 9).

When comparing median cord arterial pH, the waterbirth arm was higher (7.23) compared with the land birth arm (7.18) but this difference was not significant ($p = 0.145$). One baby in the waterbirth group had a pH < 7.1. Cord arterial oxygen level was not significantly different ($p = 0.21$) in the waterbirth arm (Mean 2.86Kpa, SD 1.13) compared with the land birth arm (Mean 2.41Kpa, SD 0.74). There was no significant difference in base excess levels, haemoglobin or packed

cell volume between the two groups. However, there was a significant difference in cord arterial carbon dioxide levels with the mean land birth level of 7.76Kpa (SD 1.24) compared with a lower 6.26Kpa (SD 1.49) for the waterbirth group (p = 0.003). However, it is recognised that this study is under powered.

One of the anxieties concerning waterbirths for the fetus is the risk of overheating of the mother in the warm water – affecting fetal-maternal thermoregulation (Rosevear et al, 1993). However, there was no statistical difference between the rectal temperature at birth for those born in water (mean 36.7^0C, SD 0.47) and those born on land (mean 36.6^0C, SD 0.53).

Infection is another concern surrounding waterbirth (Hawkins, 1995; Jenkins, 1996). Swabs taken at birth, for microbiological analysis, from the umbilicus revealed that 25 (62.5%) of the water babies had no bacterial growth or no significant bacterial growth compared with 13 (65%) of the control group. Eleven (27.5%) of the waterbirth babies cultured one type of bacteria compared with two (10%) of the land births (Table 3.6). There was no statistical difference

Table 3.6: Results of the swabs taken from baby at delivery: organism cultured and number in each of the trial arms.

Organism	Randomised waterbirth	Randomised land birth	Preference arm waterbirth	Preference arm land birth
Mouth	***n* = 36**	***n* = 15**	***n* = 7**	***n* = 9**
Staphylococcus aureus	1	0	0	1
Staphylococcus epidermidis	3	0	1	1
Diphtheroids	1	0	0	0
Escherichia coli	4	1	0	0
Coliforms	0	1	1	0
Enterococcus faecalis	1	0	0	0
No growth	26	13	5	7
Ear	***n* = 37**	***n* = 15**	***n* = 7**	***n* = 10**
Staphylococcus epidermidis	7	1	0	1
Escherichia coli	4	0	1	0
Coliforms	1	0	2	0
Candida species	3	0	0	0
Haemophilus influenzae	0	1	0	0
Enterococcus faecalis	0	1	1	0
B-Haemolytic group B *streptococcus*	0	1	0	0
Lactobacillus	0	1	0	0
Alpha-Haemolytic *streptococcus*	0	0	1	0
Bacillus species	0	0	0	1
No growth	24	12	2	8
Umbilicus	***n* = 37**	***n* = 15**	***n* = 7**	***n* = 8**
Staphylococcus epidermidis	4	0	1	0
Staphylococcus aureus	0	0	0	1
Escherichia coli	4	1	0	0
Diphtheroids	1	0	0	1
Beta Haemolytic group B *streptococcus*	1	0	0	0
Coliforms	1	1	0	0
Candida	1	0	1	0
Bacillus species	0	0	0	1
No growth	25	13	5	5

between the observed and expected frequency (Fisher's exact probability = 0.297, two-tailed test). There was no difference between growth on swabs from the ear (Fisher's exact probability = 0.340, two-tailed test) or the mouth (Fisher's exact probability = 0.297, two-tailed test). The organisms which were most frequently found were *Escherichia coli* and *staphylococcus epidermidis*. *Candida* species were cultured from the ear swabs of three babies in the waterbirth RCT arm.

There was no statistical difference in incidence of meconium-stained liquor in labour or at birth, 10 (25%) waterbirths compared with four (20%) land (Fisher's exact probability = 0.756, two-tailed test).

Another assessment of the condition of a baby at birth is its ability to feed. There was no statistical difference between the groups for length of time to the first feed after birth.

Three babies (7.5%) in the waterbirth arm were admitted to the neonatal unit compared with one (5%) from the control group (Fisher's exact probability = 0.291, two-tailed test). The reasons for the water baby admissions: one baby for meconium aspirate and jaundice, one baby for an infection screen following prolonged pre-labour ruptured membranes and maternal pyrexia, and one baby was 'grunting'. The land birth baby was admitted for observation after it was 'grunting'.

The four babies admitted to the neonatal unit were treated with antibiotics (Table 3.7). Another waterbirth arm baby was admitted to the neonatal unit because of cyanosis a few hours after birth. Except for the baby admitted to the neonatal unit for meconium aspirate, no other babies required treatment for jaundice.

No statistical difference was found between groups when looking at length of stay in hospital (p = 0.70). The waterbirth median length of stay was 28 hours compared with 30.5 hours for the land birth babies. Two babies in the waterbirth arm were in hospital for longer, one for 17 days and another for 12 days. Neither of these babies was actually born in water and the mothers did not use water for pain relief.

Six weeks after delivery women were asked if their baby had any problems after discharge from midwifery care (Table 3.8). One baby in the waterbirth arm was admitted to hospital after discharge from the maternity services for investigations unconnected with his birth.

Table 3.7: Outcomes for babies (randomised arm). Values are given as n (%), mean [SD] or median {range}.

	Random Allocation		*P*
	Water (*n* = 40)	**Land (*n* = 20)**	
Weight (grams)	3500 [414.3] *39**	3468 [485.5] *20**	0.78
Head circumference (cm)	34.5 [1.31] *39**	34.4 [1.38] *20**	0.67
Length (cm)	50.9 [2.6] *39**	51.0 [2.30] *20**	0.81
Sex of baby			
Female	23 (57)	7 (35)	
Male	17 (43)	13 (65)	
Incidence of meconium-stained liquor	10 (25)	4 (20)	0.67
Apgar < 8 at 5 minutes	1	0	
Breast feeding	31 (78)	18 (90)	0.47
Time to first feed (minutes)	56.5 {23 – 833} *34**	60.0 {17 – 909} *17**	0.53
Cord arterial pH	7.23 {7.037 – 7.403} *35**	7.18 {7.045 – 7.260} *13**	0.15
Cord venous pH	7.32 {7.147 – 7.520}	7.33 {7.147 – 7.424} *16**	0.59
Cord arterial oxygen (kPa)	2.86 [1.13] *35**	2.41 [0.74] *12**	0.21
Cord arterial carbon dioxide (kPa)	6.26 [1.49] *36**	7.76 [1.24] *12**	0.003
Cord haemoglobin (g/dl)	15.86 [1.54] *30**	16.96 [2.13] *9**	0.06
Cord haematocrit	0.514 [0.06] *28**	0.546 [0.08] *9**	0.15
Arterial cord base excess (mmol/L)	-8.80 [4.36] *35**	-8.59 [3.98] *12**	0.89
Time to first breath (seconds)	6.10 (1.0 – 251) *39**	4.5 (1.0 – 35) *16**	0.60
Rectal temperature (^{0}C)	36.7 [0.467] *37**	36.6 [0.528] *16**	0.73

* Number of samples obtained

Table 3.8: Longer-term outcomes for babies (randomised arm). Values are given as n (%), mean [SD] or median {range}.

	Random Allocation		*P*
	Water (n = 40)	Land (n = 20)	
Antibiotics (number of babies)	3	1	0.71
Incidence of jaundice (number of babies)	1	0	
Admission to neonatal intensive care unit	3	1	0.71
Length of hospital stay (hours)	28.0 {3 – 720} 39*	30.5 {11 – 97} 20*	0.70
Re-admitted to hospital after discharge	1	0	

* Number of samples obtained

3.11. Comparison of 'Preference Arm' with RCT Arm

Healthcare professionals have questioned whether the results from a waterbirth RCT would be generalisable to the women who normally request a waterbirth. To address this concern the outcomes for women and neonates in the RCT arm were compared with women and the babies in the 'preference arm'. It is recognised that the trial was underpowered and the results may have occurred through chance. However, these issues have not been investigated in previous studies so the results are important to help design a future RCT.

3.11.1. Comparison of Water Samples

A pool water sample was obtained before maternal entry into the pool and another after the mother left the pool. *Pseudonomas aeruginosa* was cultured from a total of six samples. These were found in the 'before' and 'after' samples from two women in the randomised arm of the trial and from one woman in the 'preference arm' for water (See Table 3.9). Coliforms were also isolated in four samples: three from the RCT group and one from the 'preference arm'.

Table 3.9: Result of the pool water samples taken before the women entered the pool and when they left the pool: organism cultured and number in each trial arm.

Organism	Randomised waterbirth	'Preference arm' water
Pre-use of the pool		
Pseudomonas aeruginosa	2	1
Post-use of the pool		
Pseudomonas aeruginosa	2	1

3.11.2. Comparison of Pool Water Temperatures

The maximum pool water temperature recorded for women randomised to water was 40^0C compared with 38.4^0C in the water 'preference arm'. The mean maximum pool water temperature for women in the RCT group was 37.5^0C (SD 0.803) compared with 37.7^0C (SD 0.464) in the 'preference arm' group. The minimum water temperature recorded was 34.6^0C which was for a woman in the RCT group. The mean minimum recorded water temperature for women in the randomised group was 36.4^0C (SD 0.774) compared with 36.7^0C (SD 0.532) in the 'preference arm' group.

3.11.3. Comparison of Women's Baseline Characteristics

One of the main reasons that the trial design incorporated a 'preference arm' was to assess whether the baseline characteristics of women who consented to be

randomised differed when compared with women who definitely would not be randomised. A one-way between-groups analysis of variance was conducted to explore the difference, if any, between the means obtained in each arm of the trial (See Table 3.10). There was no statistical difference between age at delivery (p = 0.897) and age of completion of full-time education (p = 0.118) or professional qualification (p = 0.19).

3.11.4. Comparison of Maternal Outcomes

There were no statistical differences in maternal outcomes, such as length of labour or perineal trauma, between the two trial arms. For more in-depth information see Table 3.10.

Table 3.10: Outcomes for women in 'preference arm' with ANOVA/Kruskal-Wallis significance comparing randomised and 'preference arm'. Values are given as *n* (%) or mean [SD].

	'Preference arm'		ANOVA/Kruskal-Wallis comparison with randomised arm
	Water (*n* = 10)	Land (*n* = 10)	*p*
Length of first stage of labour (minutes)	294.3 [223.2]	515.0 [280.6]	0.31
Length of second stage of labour (minutes)	35.1 [44.6]	69.4 [80.1]	0.46
Method of delivery			
Spontaneous vaginal	7 (70)	9 (90)	0.37
Forceps/ventouse	1 (10)	1 (10)	
Caesarean section	2 (20)	0 (0)	
Analgesia			
Water	6 (60)	0	
Entonox	6 (60)	7 (70)	
Meptazinol	2 (20)	5 (50)	
Pethidine	2 (20)	2 (20)	
Epidural	2 (20)	1 (10)	
None (except water)	0	1 (10)	0.78
Maternal temperature (^{0}C)	36.9 [0.3]	36.8 [0.6]	0.27
Length of time in pool (minutes)	82 [46]		
Perineum			
Intact	5 (50)	3 (30)	0.39
Episiotomy	2 (20) *	1 (10)	
Labial tear	2 (20)	1 (10)	
Vaginal tear	1 (10)	1 (10)	
First degree tear	0	2 (20)	
Second degree tear	1 (10)	4 (40)	
Third degree tear	0	0	
Maternal satisfaction +	4.50 (0.55)	3.78 (0.97)	0.58

* Did not deliver in the pool + Measured on a scale of 0 – 6 (0 = *not at all satisfied*, 6 = *extremely satisfied*)

3.11.5. Comparison of Neonatal Baseline Characteristics

A one-way between-groups analysis of variance was conducted to explore the difference, if any, between the means obtained in each arm of the trial. There was no statistical difference between the randomised and 'preference arm' groups regarding gestation of pregnancy, the neonatal length ($F(3, 73) = 0.136$; $p > 0.938$), head circumference ($F(3, 73) = 1.959$; $p > 0.128$) or weight ($F(3, 75) = 0.909$; $p > 0.441$).

3.11.6. Comparison of Neonatal Outcomes

There were no statistical differences in neonatal outcomes between the RCT and 'preference arm' babies. For more in-depth information see Table 3.11.

Table 3.11: Outcomes for neonates in 'preference arm' with ANOVA/Kruskal-Wallis significance comparing randomised arm and 'preference arm'. Values are given as *n* (%) or mean [SD].

	'Preference arm'		ANOVA/Kruskal-Wallis comparison with randomised arm
	Water (*n* = 10)	Land (*n* = 10)	*p*
Weight (grams)	3723 [384.3] 10*	3464 [437.0] 9*	0.441
Head circumference (cm)	35.4 [1.67] 9*	34.1 [1.80] 9*	0.128
Length (cm)	50.7 [2.56] 9*	51.3 [1.94] 9*	0.938
Sex of baby			
Female	5 (50)	4 (40)	
Male	5 (50)	6 (60)	
Apgar < 8 at 5 minutes	0	0	
Cord arterial pH	7.24 {7.16 – 7.37} 7*	7.20 {7.12 – 7.30} 7*	0.336
Cord venous pH	7.28 {7.25 – 7.48} 5*	7.33 {7.27 – 7.49} 10*	0.727
Cord arterial oxygen (kPa)	2.57 [1.41] 7*	2.60 [0.62] 7*	0.61
Cord arterial carbon dioxide (kPa)	6.14 [0.81] 7*	6.74 [0.77] 7*	0.009
Cord haemoglobin (g/dl)	14.7 [0.78] 3*	16.3 [1.79] 8*	0.067
Cord haematocrit	0.489 [0.05] 3*	0.526 [0.05] 8*	0.092
Arterial cord base excess (mmol/L)	-6.83 [4.49] 7*	-8.39 [3.34] 7*	0.730
Time to first breath (seconds)	21 0 (6 – 38) 5*	2.5 (1 – 33) 10*	0.097
Rectal temperature (^{0}C)	36.8 [0.465] 10*	36.5 [0.359] 9*	0.696
Antibiotics (number of babies)	0	0	
Time to first feed (minutes)	50.0 {19 – 152} 9*	50.0 {22 – 80} 9*	0.757
Breast feeding (number of babies)	8 (80)	8 (80)	0.781
Admission to neonatal intensive care unit	0	1	
Incidence of jaundice	0	0	
Length of stay in hospital (hours)	19.5 {0 – 93}+	20.5 {0 – 110}+	0.366

* Number of samples obtained
+ One women in each 'preference arm' gave birth at home

3.11.7. Comparison of Maternal, Neonatal and Pool Water Temperatures

One concern that has been raised by many healthcare professionals is the effect that maternal immersion during labour and birth may have on the fetal-maternal thermoregulation process. As discussed previously, there are no statistical differences for maternal and neonatal mean temperatures when comparing the trial groups. However, in view of the lack of evidence surrounding this issue it was decided to provide details for all women who used water immersion at some stage of their labour. Table 3.12 illustrates the minimum and maximum pool water temperatures during water immersion, the water temperature at birth, maximum maternal temperature and the temperatures for the neonate at birth obtained for this study. Interestingly, none of the minimum pool water temperatures were as low as the sea water temperatures quoted by Harper (2002). In this study, two women reported in their 6 week questionnaire that they left the pool because the water was too cold for them and that the midwives would not 'allow' them to have it any hotter. One woman had her water temperature maintained between 34.6^{0}C and 35.7^{0}C. The other woman's water temperature was maintained between 35.3^{0}C and 36.8^{0}C. Both women were in the waterbirth RCT group. This may suggest that if women are given a choice warmer water, rather than cooler water, is more comfortable.

Table 3.12: Illustrates the Minimum and Maximum Pool Water Temperatures for Each Woman, the Pool Water Temperature at the Time of Birth, the Maximum Temperatures for Each Woman and the Neonatal Temperature for all Women who Used the Pool at Any Stage in Labour.

	Minimum Pool Water Temperature	Maximum Pool Water Temperature	Pool Water Temperature at Birth	Maximum Maternal Temperature	Neonatal Temperature after Birth
RCT	35.5	38.2		37.1	36.6
	37.0	37.5		36.5	37.2
	37.2	37.2		37.4	36.2
	36.8	37.4		37.4	36.6
	36.5	38.0	37.2	37.2	37.0
	37.3	37.6	37.4	37.0	36.8
	36.0	37.0		37.0	36.0
	37.0	38.0	37.0	38.0	37.0
	36.8	40.0		37.3	37.2
	36.3	37.4	37.1	37.4	37.0
	35.9	37.1	36.9	37.6	37.0
	35.3	36.8		36.8	37.0
	35.2	37.5	37.3	36.3	36.8
	36.0	36.8	36.8	36.1	36.2
	36.4	37.5	37.0	36.7	36.8
	34.6	35.7		37.2	35.9
	36.9	37.8		36.6	36.4
	37.2	37.7	37.2	37.2	
mean	**36.3**	**37.5**	**37.1**	**37.0**	**36.7**
Preference Arm	35.9	37.9	37.0	37.2	36.6
	37.0	37.2	37.0	37.2	37.0
	36.9	38.4		36.3	36.2
	37.3	37.5	37.3	36.8	37.2
	36.6	37.5	37.0	37.5	37.0
Mean	**36.7**	**37.7**	**37.1**	**37.0**	**36.8**

3.12. Discussion

This is the first RCT to allocate women to either a waterbirth or a land birth. This study was designed to determine whether it would be feasible to undertake a larger multi-centre waterbirth RCT to examine the effect of being born in water on a baby. Many of the uncertainties about undertaking a waterbirth RCT related to the actual users of maternity services. One of the main questions to be answered was whether women would be willing to participate in a RCT to be allocated to either a water or land birth. By consenting to be randomised, women would not be able to exercise their ability to choose or decide their birth environment. Women were, however, made fully aware, verbally by the researcher and also by the participant information sheet, that they could withdraw from the study at any time if they so wished. The results of this study indicate that women were willing to participate. Recruitment was slower than wished as the grant only paid for a midwife to work four hours a week on the project so limited time was available for recruitment. In addition, this was also the first time a research project had been undertaken by a midwife within the maternity unit, so it took time for clinical midwives to become familiar with discussing the project with suitable women. As referrals from the midwives were slower than anticipated, the local media were approached to publicise the study. This increased the recruitment rate as many more women became aware of the study.

The ten women for the water 'preference arm' were recruited within a few weeks, which suggests that women were willing to participate in a research project. The ten women for the land birth 'preference arm' took longer to find, which suggests that women may be reluctant to join a research study if the topic holds no special interest to them.

There was also concern that the women who participated in the RCT might be different in some way from the 'normal' users of the pool and subsequently may have different outcomes. If so, a RCT would not provide evidence appropriate to the 'normal' pool users. The inclusion of a 'preference arm' in this study was to compare the characteristics and the outcomes of the women who were randomised with those who could choose their method of birth by joining the 'preference arm'. There were no statistically significant differences between the women's characteristics and the outcomes of the two trial 'arms' for either the women or their babies. This suggests that randomisation does not affect the characteristics of women using the pool and, therefore, healthcare professionals could have confidence in the results obtained from a larger RCT (Fielding et al., 1999).

Women were randomised to the study after 36 weeks' gestation so that they knew their allocation before they went into labour. The randomisation process was weighted towards waterbirths but there were still only 10 (25%) babies born in water in the waterbirth arm compared with five (50%) in the 'preference arm'.

When taking into consideration only those randomised women who entered the pool (*n* = 23), then ten (43.5%) actually achieved a waterbirth – which is nearer the expected figure. Unfortunately, many of the women were not eligible to use the pool when admitted in labour, which backs Brown's (1998) audit finding that only 50% of women who pre-booked the pool prior to labour actually used it. If a larger study is organised than one consideration must be at what stage of pregnancy a woman should be randomised. One suggestion would be to consent the woman to the trial between 36 – 41 weeks' gestation but to delay randomisation until arrival to the labour ward when in labour. This would enable women to be reassessed for eligibility and would also ensure that the pool was available for use.

Another priority was to see whether it would be possible and practicable to collect the data and samples. It had been suggested that it would not be feasible due to poor midwifery staffing (Forde et al., 1999). Much of the information and some of the data were obtained from routine maternity records. However, sometimes the maternity records were not as complete as expected. Information, such as time of first feed, baby's temperature at birth and head circumference, was not recorded, which was disappointing. Unfortunately, some of the midwives did not collect the neonatal swabs, cord bloods and water samples which were requested for analysis. This was particularly disappointing as a group of four midwives had volunteered to be called to help collect the samples and obtain data if the unit was busy. However, these midwives were called on very few occasions, even when needed. The reason for not collecting samples and data was often recorded

on the check list as 'there was too much going on at the delivery'. There seemed to be a lack of appreciation that the babies needing resuscitation were the ones who required cord blood gas analysis to help assess their condition at birth. However, it is now routine at many maternity units to obtain cord arterial and venous blood for analysis especially when there is concern about a baby's condition at birth. If a similar study was repeated, cord blood samples would be obtained more effectively as midwives are now familiar with the procedure and understand the need to obtain samples to assess the baby's condition at birth.

Concern about the safety of a baby being born in water is the reason why many healthcare professionals do not fully endorse use of water as a method of pain relief during the birthing process. It is difficult to judge accurately the condition of a baby at birth (Nordstrom et al., 1998). Traditionally cord arterial pH <7.00 or Apgar score < 7 at five minutes leads to concerns over neonatal morbidity (van den Berg et al., 1996). Only one waterbirth arm baby had an Apgar of < 7 at five minutes. The paediatricians decided that the reason for the low Apgar scores of this baby (1 at one minute, 4 at five minutes, 10 at ten minutes) was the regular injections of analgesia given in labour for the mother's pain relief which caused depression of the baby's respiratory system. This woman did not use the pool as she had pre-labour prolonged ruptured membranes. The only statistically significant result (p = 0.003) from blood samples obtained in this group was a higher land birth carbon dioxide level (mean 7.76 kPa, SD 1.24) than the waterbirth group (mean 6.26 kPa, SD 1.49). This indicates a desirable reduction in carbon dioxide for the waterbirth group, which may be due to midwives' not

encouraging women in the pool to use the valsalva manoeuvre during second stage of labour (Caldeyro-Barcia et al., 1981). However, it is recognised that this study is under-powered and only a small number of paired samples were obtained.

One major concern surrounding waterbirths is the risk of a baby breathing after birth while under the water, and as a result, inhaling pool water (Rosser, 1994). At birth, environmental temperature is a major determinant in initiating the baby's breathing. Warmth, in the absence of prolonged or severe hypoxia in utero, is an inhibitory factor to breathing. Environmental cooling by $1^0 - 2^0$C stimulates the fetal receptors in the upper airways and breathing movements ensue (Johnson, 1996). If a baby is born in water at the same temperature as amniotic fluid following spontaneous labour, with no signs of fetal distress, and with the cord intact, it should be successfully inhibited from breathing (Johnson, 1996). There was no incidence of aspiration of pool water in this study in any of the trial groups. One waterbirth arm baby did aspirate meconium at delivery and needed neonatal intensive care. However, the mother was not eligible to use the pool on admission because 'thick meconium-stained liquor' was noted. It has been stated that the problem is being able to identify babies who are asphyxiated, showing no obvious signs of fetal distress, who may breathe while under water and inhale pool contents (Rosser, 1994; Hartley, 1998; Kassim et al., 2005). However, the evidence from this study would indicate that midwives are vigilant in assessing women before they use the pool and monitor them carefully while in the pool. Both the maternal temperature and the water temperature are regularly checked

to prevent overheating of the mother, which could cause fetal distress. The water temperature is maintained between 37^0C – 37.5^0C for the birth to prevent initiation of breathing. In this study this temperature range was adhered to.

It has been speculated that a rise in maternal temperature, while using the pool, may have contributed to the deaths of two babies, in the 1990s, by affecting the fetal-maternal thermoregulation process (Rosevear et al., 1993). The fetus is totally dependent on the mother for thermoregulation (Power, 1989). Heat produced by the uterus must flow to the maternal body to be dissipated. For this physiological process to occur, a fetal-maternal temperature differential of 0.5^0C is required. Therefore, an important factor for the well-being of the fetus and neonate is the maternal temperature in labour. There was no statistical difference for mean maternal temperature during childbirth or for neonatal rectal temperature at birth between the groups, which suggests that careful monitoring of both maternal temperature and water temperature, as practised in this trial, maintains fetal-maternal thermoregulation.

The fetal condition during labour is assessed by intermittent auscultation of the fetal heart. Following abnormal observations some women (n = 2) were advised to leave the pool because of anxieties about the baby. It is important that women appreciate the need to leave the pool, if advised, to prevent possible risk to the baby at birth. By being vigilant in assessing both mother and fetus, the midwives hope to prevent a baby that is not coping with labour from being delivered in the

pool. Advocates of waterbirths report that the baby appears to be calmer when delivered in the pool (Burns & Greenish, 1993) and few cry at birth. The longer median time to first breath in the waterbirth arm was not significant in this study and would be expected as a result of the short delay between birth and the baby coming to the surface of the water.

There was no evidence of clinical neonatal infection, which confirms the findings of Garland and Jones (1997) in their waterbirth audit. Brown (1998) reported that culture from ear swabs grew *pseudomonas aeurginosa* on two occasions. Despite these bacteria being cultured in water samples obtained for the study, swabs from babies did not culture the bacteria. This would support the suggestion that the pool water provides a possible wash-out effect which protects the baby from bacteria (Zanetti-Dallenbach et al., 2006a).

Three of the trial contaminated pool water samples came from the sample obtained before women entered the pool. Samples from the same women after pool use also cultured *pseudomonas aeurginosa*. It has been suggested that *pseudomonas aeurginosa* may be present in stagnant water remaining in the pool taps if the pool has not been used on a daily basis (Robb et al., 1991). Running the pool taps for five minutes each day may prevent this occurrence. Many of the bacteria cultured on the neonatal swabs were normal skin flora, probably due to contamination from early skin to skin contact in the waterbirth group, which caused no clinical problems. When this study was carried out routine skin to skin

contact between mother and baby at birth was not normal practice following a traditional land birth.

Other studies have noted an increase in incidence of snapped umbilical cord when a baby is born in water (Gilbert & Tookey, 1999; Hawkins, 1997; Rosenthal, 1991). It is thought that if a cord is shorter than normal, when the baby is lifted to the surface of the water, it is put under strain and then 'snaps' under the pressure. This could lead to a loss of blood from the baby – causing anaemia. Midwives are advised to check the cord is intact when a baby is brought to the surface of the water. There was no incidence of 'snapped' cord in this study. Another concern is increased risk of jaundice caused by the cord pulsating for longer because of the warm water (Austin et al., 1997). However, there was no difference in haematocrit and haemoglobin levels found in this study between land and water births. Only one baby whose mother was randomised to water was treated for jaundice.

There was no significant statistical difference between other neonatal outcomes measured to assess the baby's condition at birth. Although more of the waterbirth arm babies were admitted to the neonatal intensive care unit compared with the land birth arm, it was not statistically significant. None of these babies was actually born in water and none of the mothers had laboured in water. Midwives had realised that the mothers were not able to use the pool as they did not match the eligibility criteria when they were admitted in labour.

Length of hospital stay may also be an indication of complications due to birth. Again there was no statistical difference in length of stay between waterbirth and land birth babies. Two waterbirth arm babies, who were not actually born in the pool, were in hospital for a prolonged period. One baby had inhaled thick meconium at delivery and later was found to have a pneumothorax and was transferred to a specialist neonatal unit for treatment. The other baby was born soon after the mother was admitted to labour ward before she could enter the pool. His condition was good at birth but a few hours later he suffered a 'cyanotic attack' and 'fitted' several times. He too required ventilation. The problem was thought to be a deviated nasal septum, which had become blocked by mucus. He made good progress and had no problems after discharge. One baby from the waterbirth arm of the RCT needed to be admitted to hospital within six weeks of delivery with possible pyloric stenosis.

3.13. Power Calculations for a Future Waterbirth Trial

This was a small study, so a larger trial is required to assess more reliably the possible risks to the baby of a waterbirth. However, it has provided some statistical data to calculate numbers of women required for a larger study. To have a power of 80% of showing that the mean umbilical cord arterial pH is equivalent in babies born in water or on land, it would be necessary to include at least 1220 births, equally randomised to the two methods, with the assumption that 'equivalent' is defined as having a mean pH within 0.02 of each other.

Other possible primary outcomes for further consideration are the percentage of babies with a cord pH below 7.05, the percentage with Apgar score less that 7 at five minutes, and the percentage admitted to a neonatal intensive care unit. These would all lead to larger studies for the same power, of the order of 1500 – 2500 births, taking equivalence to 0.5%.

3.14. Conclusion

It is recognised that this is a small study but it may provide further evidence to support midwives and obstetricians when providing information to women who wish to discuss the advantages and concerns of having a waterbirth. This study demonstrates that women are willing to be randomised. One midwife working part-time (approximately 4 hours a week) was able to randomise 60 women in 10 months. Initially recruitment was slow because community midwives were not making referrals. However, once the researcher obtained media coverage for the study women became aware of the study and contacted the researcher. Unfortunately, the original study design did not allow for the high rate of women not using the pool when in labour. The results of this study support the feasibility of organising a multi-centre RCT which would fully evaluate the differences between land and waterbirths on a large enough sample size to provide statistical significance. One aspect which needs to be addressed is the best time to recruit and randomise women to ensure more women actually manage to have a

waterbirth. Another issue which needs consideration is to investigate midwives attitudes to waterbirths. This will be explored in Chapters 5 and 6.

The next chapter in this thesis provides the results of the questionnaires which women were asked to complete, while participating in this waterbirth study, to assess their expectations and satisfaction with their childbirth experience and thoughts about participating in the RCT.

CHAPTER 4: WOMEN'S EXPECTATIONS, SATISFACTION AND VIEWS ON PARTICIPATION

This chapter reports on a prospective, longitudinal, descriptive survey of women who participated in the waterbirth study reported in Chapter 3. Women were asked to complete at three specific time-points during the waterbirth study: antenatal at recruitment, post-birth and six weeks after the birth.

As mentioned in Chapter 1, some healthcare professionals doubt whether a waterbirth RCT would be appropriate to evaluate a method of care like waterbirths (Garland & Jones, 1994). Another concern that opponents of RCTs have is that randomisation takes away the opportunity of choice and control from participants so as a consequence will impact on women's satisfaction with their childbirth experience (Jowitt, 2001). Opponents of a waterbirth RCT have stated that women would not wish to consent and participate in such a trial for those reasons (Jenkins, 1996) and certainly it would not be possible to recruit the numbers of women which would be required in order to provide robust, valid results (Garland, 2000, p. 91). Therefore, it was thought to be important to investigate these concerns while conducting the waterbirth study.

4.1. Background

In the United Kingdom, since 1993, Governments have encouraged each childbearing woman to assume control of her birth experience and exercise the right to make choices and decisions about her care (DH, 2007; DH, 2005; DH, 2004; DH, 1993). Increasing women's choice and control during pregnancy and childbirth are seen as important factors in promoting positive psychological outcomes for women (DH, 2007; DH, 1993). Recently, there has been an acknowledgement that women's satisfaction with their care should be an accepted measure of assessing maternity services (NCCWCH, 2007; Healthcare Commission, 2007). However, it has been stated that maternal satisfaction is complex and not easy to measure (Brown & Lumley, 1998; Waldenstrom et al., 1996).

The relationship between the concepts of choice and control was investigated by Green (1990) who found that choice aids control and an absence of choice implies a lack of control. Control has been shown to influence outcomes not only in the short term, by increasing satisfaction (Green, 1990), but also provides long-term benefits lasting for twenty years (Simkin, 1992). By removing choice and therefore control, it is feared that women may lack a feeling of fulfilment and this would impact negatively on their satisfaction with their childbirth experience which can also last for fifty to sixty years (Kitzinger, 1992) and could have an indirect negative effect on the bonding and relationship with the child (Barnes et al., 2007).

Green et al., (1998a) describe two levels of control which women experience in labour. The first they describe as 'external' control. The concept of 'external' control is the control a woman has over her environment and what is done to her. One reason that some women decide to give birth at home may be to maintain 'external' control (Green et al., 1998a). The second level of control is 'internal' control. This was first described by Lamaze (1958) and is described as women maintaining control over their own behaviour (Green et al., 1998a), which has been found to be important for women (Dahlen et al., 2010). Feeling out of control of their body or behaviour could result in women feeling inadequate, frustrated and disappointed with themselves, attributable to a perceived lack of performance and resilience (Matthews & Callister, 2004). However, others have stated that for women to achieve a positive childbirth experience they must relinquish 'internal' control rather than try to dominate the physiological childbirth process (Dick-Read, 1944). It has been claimed that if women could allow themselves to be unaffected by their birth environment and behave instinctively, such as feeling free to make a noise and change position, they could be focused, release their inhibitions and achieve self-control (Dahlen et al., 2010; VandeVusse, 1999).

The role and attitude of caregivers also have a significant role in the childbirth experience (Green & Baston, 2003). A woman's perception of the experience and satisfaction with it can be affected by the caregiver (Goodman et al., 2004). Dahlen et al. (2010) found that women who birthed in hospital wanted caregivers to assume responsibility and provide direction. On the other hand, if women who

birthed at home were given information, they would take on responsibility for decisions and felt that the enhanced relationship with caregivers made them feel less frightened and they perceived themselves to have greater control over their childbirth experience. However, feelings of control are lessened if a woman loses trust in her caregivers (Matthews & Callister, 2004; Dahlen et al., 2010).

Another aspect of maternal satisfaction is a woman's level of control over decisions in labour. A woman's ability to maintain control can depend on the attitude of healthcare professionals, whether the woman has had narcotics in labour, her level of fatigue and pain, and her expectations and preparation for labour (VendeVusse, 1999). Women who prepare for childbirth and have expectations which are fulfilled feel more satisfied with the overall experience (VendeVusse, 1999).

As part of the RCT waterbirth study it was decided to ask women to complete questionnaires in order to address some of the issues surrounding the choice of randomisation as the research methodology: a prospective, longitudinal, descriptive survey.

4.2. The Aims and Objectives of the Survey

One aim of the survey was to investigate whether women who agree to be randomised have different characteristics from women who wish to choose

whether to use the pool. The use of a 'preference arm' allowed the impact of active choice on outcomes to be assessed (Burns & Grove, 2009) by comparing the responses from women in the RCT with women who joined the 'preference arm'. A second aim was to obtain women's views about participating in a RCT.

The objectives were:

I. To assess whether women who consent to be randomised have different expectations for labour and childbirth compared with women in the 'preference arm'.

II. To investigate whether randomisation affected women's satisfaction with their childbirth experience.

III. To determine whether randomisation was detrimental to the participants' birthing experience.

IV. To explore women's feelings post-natally about participating in a RCT.

4.3. Survey Design

A survey was the research design method because it is suitable to obtain information from a large group of people in order to provide a 'general overview' of the topic of interest (Hicks, 1999) and is a useful way of finding out information

where there are gaps in knowledge of a given topic (Rees, 2003). It is then possible to explain/summarize the findings by use of numbers (Rees, 2003) to 'describe the prevalence, distribution and interrelationships of variables' (Parahoo, 2006) within the participant group. Therefore, this method was appropriate to obtain information in order to describe women's expectations for, and satisfaction with, their childbirth event. Furthermore, as the aims of this survey were to obtain 'an accurate portrayal of the characteristics' (Polit et al., 2001) of the women and information about their thoughts of participating in the RCT, a descriptive survey method was selected. The prospective, longitudinal design was appropriate because women would be followed up at three specified time-points (Peat, 2002) from recruitment until completion of data collection. Questionnaires are the usual form of data collection employed in surveys (De Vaus, 2002) and were used for this study.

Questionnaires are relatively cheap and quick to administer and participants can answer them in their own time and at their own pace (Watson et al., 2008). Participants in the waterbirth study were asked to complete three questionnaires. The first was completed prior to randomisation. A second questionnaire consisted of a numbered scale to assess maternal satisfaction immediately after the birth. The third questionnaire was a postal questionnaire which was sent to women to complete six weeks after childbirth.

There were three specific points to be addressed in asking women to complete the questionnaires. The first was to find out whether women who were willing to be randomised differed in their expectations for labour and childbirth compared with the women in the 'preference arm' of the study. The second point was to determine whether participation in the RCT affected any aspect of maternal satisfaction after childbirth and to determine whether randomisation was detrimental to the participants' birthing experience. The use of a 'preference arm' was included in the trial methodology to allow the impact of active choice on outcomes to be assessed (Burns & Grove, 2009) by comparing the responses from women in the RCT with women who joined the 'preference arm' of the trial. Thirdly, it was decided that it was important to ask women how they felt about joining a research project. Therefore, in the postnatal questionnaire women were asked how they felt about participating in a RCT and whether they would join a similar study again.

4.4. Development of the Waterbirth Study Antenatal and Postnatal Questionnaires

The antenatal and postnatal questionnaires were developed specifically for the study, using some of the questions used in a previous survey (Green et al., 1998a). Permission was sought and obtained from the Great Expectation Survey authors (Green et al., 1998b) to use selected questions (Green, 2000; personal communication). The Great Expectations Survey was a prospective study of women's expectations and experiences of childbirth which matched the aims of

this waterbirth study to examine maternal choice and satisfaction. It is accepted that questionnaires developed for one study may be used by other researchers (Watson et al., 2008). Green et al., (1998a) sent the main postal questionnaires to women to reach them by 36 weeks of pregnancy. Women received a postnatal questionnaire six weeks after the birth.

A decision was made not to use the complete Great Expectations survey questionnaires for the RCT waterbirth study questionnaires as many of the questions did not match the aims of this RCT. For example, in the antenatal questionnaire there were several questions about childbirth classes, induction of labour, the provision of information by healthcare professionals which were not of interest to this research study. Some questions were also outdated and no longer applicable. For example, women were asked how they felt about having an enema and being shaved, which are no longer routine labour procedures. By using only selected questions from Green et al., (1998b) questionnaires, it is acknowledged that women's views in this study were obtained by using questionnaires which were not validated. This was thought to be justified because the wording of the questions had been checked by piloting the original survey (Green et al., 1998a) and was not altered in any way. There were also financial and time constraints imposed by the funding hospital Trust which impacted on the amount of work which could be undertaken to develop such a questionnaire. By using some questions from the Great Expectations survey it was hoped that it would be possible to compare the responses obtained from the

participants in the study RCT and 'preference arms' with the results obtained by Green et al., (1998a).

4.4.1. Antenatal Questionnaire

When choosing the questions to use from the Great Expectations Survey (Green et al., 1998b) questions were assessed for content validity to ensure that the questions covered the topics of interest (Polit et al., 2001) for the waterbirth study and also face validity to ensure the questions would 'appear to obtain the information' (Peat, 2002) required for the purpose of the waterbirth study to obtain accurate results (Rees, 2003). If a respondent does not perceive that the content of the questionnaire matches the purpose it is meant to achieve the result may be poor compliance because of lack of motivation to respond (Sim & Wright, 2000). It was decided to concentrate on aspects which could affect a woman's satisfaction and which could be affected by randomisation. As maternity services are encouraged to provide women with choice, control and continuity of care (DH, 1993; DH, 2007), the questions were chosen which would offer some insight into a woman's experience of these concepts. Information and knowledge were also deemed to be important in assisting with a woman's decision making. Questions asking about a woman's hopes and aspirations for labour, such as whether it will be a fulfilling experience, were also thought to be important. Table 4.1 provides an outline of the aspects which were relevant to assess satisfaction and the topics covered by the questions to obtain the data.

Table 4.1: The Aspects of Interest in the Antenatal Questionnaire

Aspect of interest to assess women's satisfaction & expectations	Topics covered by the questions
1.Choice	Place of birth Intended method(s) of pain relief
2. Emotions	Feelings when discovered pregnancy The mood during pregnancy
3.Information and Knowledge	Attendance at parent education sessions Reasons for non-attendance Thoughts about amount of information given in pregnancy
4. Decisions	Birth Plan written Who should make decisions in emergency and non-emergency situations
5. Control	Coping with contractions Whether assertive with midwives/doctors providing care
6. Level of intervention in labour	Thoughts about: • Episiotomy • Augmentation of labour • Induction of labour • Continuous fetal monitoring • Instrumental delivery
7. Hopes and expectations	Whether labour will be a fulfilling experience Midwifery staffing: • Whether women had met the midwife providing labour care • Whether the same midwife was present for the entire labour • The number of staff entering the labour ward
8. Pain in labour	Expectations of level of pain Methods of pain relief
9. Previous experience	Open question

The questionnaire which can be seen in Appendix 9 consisted mostly of single response closed questions where a respondent is provided with a list of possible answers and is asked to endorse one by 'ticking the box' or 'circling' the option which they think reflects their thoughts or feelings. Closed questions are easier and quicker for participants to answer (Oppenheim, 1992), although there may be the introduction of 'bias' because respondents may be 'forced' to choose between the options provided (Oppenheim, 1992). They may answer with a choice which possibly had not occurred to them previously or be forced to tick a choice which they may not fully agree with (Oppenheim, 1992).

Three open-ended questions were included in the antenatal questionnaire. Open-ended questions allow respondents to give their views in their own words (Watson et al., 2008). However, the quality of the responses can vary between respondents and there can also be a high non-response rate (Watson et al., 2008). Other disadvantages are that respondents may provide different amounts of data when responding to open-ended questions, may deviate from the question and hand writing may be difficult to decipher (Parahoo, 1997). In the antenatal questionnaire, women were asked if they felt that they would prefer to have their baby in an alternative place rather than the place of birth already booked. If women said 'yes', they were asked two open-ended questions to obtain information about their preferred place of birth and why it was not possible to have this. The third open-ended question gave women an opportunity to explain any previous experiences which may impact on their hopes and expectations for their labour. It is acknowledged that women's expectations may

be influenced by previous maternity experiences, or experiences of their friends or family members (Green et al., 1998a).

4.4.2. Post Delivery Questionnaire

In order to assess maternal satisfaction immediately after delivery, women were given a numbered scale: 0 = *meaning not at all satisfied* to 6 = *meaning extremely satisfied* before leaving the labour ward (Appendix 11). A numerical scale, with anchors at each end, can be used to measure attitudes (Sim & Wright, 2000) when an individual's subjective impression is wanted (Oppenheim, 1992). It was felt that a quick scoring system would be a reliable and valid method at this stage because women might be too exhausted after childbirth to complete a longer questionnaire. The woman returned the completed scale to the midwife in a sealed envelope in order to maintain confidentiality and prevent the midwife, who may have provided care, from seeing the score.

4.4.3. Postnatal Questionnaire

The aim of the postnatal questionnaire was to investigate women's satisfaction with their childbirth experience and look for differences between the two trial arms. In order to achieve this aim, the questions asked women about some of the topics which were examined in the antenatal questionnaire. No questions were asked about the place of birth because this question had been answered

fully in the antenatal questionnaire and was no longer relevant during or after the birth.

The question in the Antenatal Questionnaire asking about women's previous experiences which might impact on the labour experience was replaced by two questions which asked women about breastfeeding and any problems which had occurred with their babies since the birth.

The postnatal questionnaire (Appendix 12) consisted mostly of single response 'tick the box' questions obtained from the Great Expectations Survey (Green et al., 1998b). The questions were assessed for content and face validity and specifically chosen to ask women about the same aspects covered in the antenatal questionnaire in order to obtain information about their childbirth experience to compare the postnatal responses with the answers provided in the antenatal period. Three questions took the form of 'adjective check lists' (Green et al., 1998a). These were used to obtain women's thoughts on three separate issues – how they described staff who saw them during labour, their own feelings during labour and words to describe their baby. Fifteen adjectives were provided for each question and women were asked to circle the appropriate words to match their feelings. Green et al., (1998a) felt that this form of question had the 'advantage of lessening the biases of open-ended questions' while not forcing

respondents to choose one answer if the question and answer format was a multiple choice one. The postnatal questionnaire also included more open-ended questions in order to obtain more in-depth information regarding the individual woman's views of her experience (Openheim, 1992).

4.4.4. Pilot of Maternal Antenatal and Postnatal Questionnaires

Once the antenatal questionnaire had been compiled, it was piloted to check how long it would take to complete and to determine if women had any problems filling it in (Oppenheim, 1992). Two pregnant Trust employees were willing to try them out. No issues were raised. The same two employees agreed to test the two postnatal questionnaires a few weeks later once they had had their babies. As with the antenatal questionnaires, no issues were raised. However, the two women did say that both the questionnaires, at first sight, seemed to be very long but it only took about 20 minutes to complete each one.

4.5. Analysis of the Questionnaires

Statistical analysis was performed using Statistical Analysis for Social Scientists (SPSS version 13, SPSS, UK, Woking, 1999). Frequency data were compared using chi-squared (x^2) or Fisher's Exact Test. Non-parametric data were compared using Mann Whitney U.

The comments provide by women in the open questions were coded and categorised into themes.

4.6. Confidentiality

Women were reminded that any information provided would be treated in confidence and that any reports or papers written would not identify them (Polit & Beck, 2012, p. 162) and that they had the right to decline to participate at any time. Questionnaires were marked as 'Confidential' and have been stored according to the NHS Trust's data protection guidelines.

4.7. Results

4.7.1. Results of the Antenatal Questionnaire

The antenatal questionnaire was completed after a woman gave her consent to participate in the study, but prior to randomisation. Therefore 80 women completed a questionnaire and this ensured that there was 100% response rate. Even though the researcher was present when women completed the questionnaires not all the questions were answered so some had missing data. The questionnaire was used to obtain a baseline concerning each individual

woman's expectations for her labour so that a comparison could be made between the randomised and the 'preference arm' women.

The next section of this Chapter will give details of the findings regarding the areas of specific interest.

4.7.1.1. Choice

When comparing whether women in the RCT were less likely or less determined to make choices about care compared with women in the 'preference arm', there was no statistical difference between the groups for choice of place of birth (p = 0.08). When asked if they would have preferred to give birth elsewhere, five women in the RCT arm said 'Yes' - they would have liked to book a home birth compared with none in the 'preference arm'. Women did not seem themselves to have decided against a home birth but had heeded the advice of others in reaching their decision. The reasons given for not choosing a home birth were:

- Husband did not want a home birth (2 women).
- Previous breech birth so advised against home birth (1 woman).
- Previous home birth, but had complications and advised not to have another home birth (1 woman).
- More convenient for everyone else if I had a hospital birth (1 woman).

4.7.1.2. Emotions

The women were asked to choose one of six responses to describe their feelings when they first realised that they were pregnant. In order to analyse the responses the words 'overjoyed' and 'pleased' were combined to form a positive outcome. A higher percentage of women in the 'preference arm' of the trial had positive attitudes towards their pregnancy - 80% (n = 16) of the women who were randomised compared with 63.3% (n = 38) in the 'preference arm'.

Twenty-one (35%) of the randomised women experienced 'mixed feelings' compared with 4 (20%) in the 'preference arm'. Only one woman (1.7%) in the randomised arm had negative feelings towards her pregnancy.

When the two groups were asked about their mood during pregnancy, there was no statistical difference between them, with 85% of women in both study 'arms' feeling 'reasonably cheerful most of the time' (p = 0.65).

4.7.1.3. Information and Knowledge

There was a statistical difference between the two trial 'arms' regarding attendance at parent education classes (p = 0.03). Two thirds of the RCT women

(*n* = 40), compared with 40% (*n* = 8) in the 'preference arm', attended parentcraft classes. Women who did not attend classes were asked to provide the reason (Table 4.2).

Table 4.2: Reasons Provided by Women to Explain Why They Did Not Attend Parentcraft Classes.

Reasons *	**RCT** ***n(%)***	**'Preference Arm'** ***n(%)***
I was not offered classes	5 *(8.3)*	5 *(25)*
I know all I need to know from previous births	7 (*11.7*)	6 (*30*)
I know all I need to know from friends/books	4 (*6.7*)	4 (*20*)
It is not convenient for me to attend classes	0	3 (*15*)
There is no point, one cannot learn how to give birth	0	1 (*5*)
I have attended classes before and do not need to attend again	13 (*21.7*)	6 (*30*)
Other	0	1 (5)

* May be more than one response per woman

The majority of women in both trial arms did not attend classes because they had had a previous birth or parentcraft class experience. Other women were not given the opportunity to attend classes (8.3% RCT, 25% 'preference arm'). This was not a surprise finding because 60% of women in the 'preference arm' were multigravidae compared with 35% in the RCT group. When the women were asked about the amount of information given to them in pregnancy, there was very little difference between the groups with 88.3% (*n* = 53) in the RCT group

and 85% (n = 17) in the 'preference arm' saying they had received the 'right amount of information' (p = 0.69).

4.7.1.4. Decisions in Labour

Women are encouraged to write a birth plan towards the end of their pregnancy to detail their personal choices for labour and the type of birth they may like (DH, 1993). As it is not possible to predict exactly what may happen it is a document which may need to be amended should circumstances change (McCormick, 2003).

It was assumed that a higher proportion of women in the 'preference arm' would complete a birth plan to ensure that the midwife who was caring for them in labour would be aware of their wishes because they, as a group, would have made definite choices. However, a larger percentage of women in the RCT trial arm 33.3% (n = 20) wrote a birth plan compared with 25% (n = 5) in the 'preference arm' but this was not statistically significant (p = 0.49).

4.7.1.4.1. Decision-making in non-emergency situations

When a woman is in labour, it is important that decisions concerning her care are made with her full and involved consent (DH, 2001). Under common law any woman has the right to refuse treatment, even when her life or her baby's life may be put at risk (GMC, 2008). Even if a woman's choice appears to be unreasonable and irrational, the courts cannot intervene if she is judged to be competent to make her own decisions (McCormick, 2003, p. 444). This means that midwives must provide support by giving clear information to ensure that a woman understands how her pregnancy and labour are progressing, and allow her to ask questions (DH, 2007). Women were first asked two questions to establish who should make decisions during labour in non-complicated circumstances (Questions 31 and 32). There was no difference between the two trial arms regarding who the women expected to make the decisions (p = 0.72), but there was a significant difference (p = 0.01) when asked '*who do you <u>think</u> should make most of the decisions*?' (Question 31). Tweve women (60%) in the 'preference arm' wanted staff to '*give their assessment of the situation but I should be the one in control*' compared with 33.3% (n = 20) of women in the RCT arm.

4.7.1.4.2. Decision-making in emergency situations (Questions 33 and 34)

Sometimes during labour emergency situations occur. Women were asked who they thought should make the decisions in an emergency situation. Sixty-three percent of women (n = 38) in the RCT arm thought that 'staff should make the decisions but would like to be kept informed' compared with 45% (n = 9) in the 'preference arm'. This resulted in a statistically significant difference between the two study arms (p = 0.01).

Another statistically significant difference was observed between the trial arms regarding whom they expected to make the decisions in an emergency situation (p = 0.02). Nine women (15%) in the RCT study arm were expecting to leave decision-making to healthcare professionals compared with one woman (5%) in the 'preference arm'.

4.7.1.5. Control of Behaviour in Labour (Questions 37, 38, 39, 40)

Women were asked whether it was important 'not to lose control' of their behaviour during labour. There was no statistical difference between the two trial arms with 70 % of women in both groups saying it was either 'Very Important' or 'Quite Important' (p = 0.193). Women were also asked how important it was to

them ‘not to lose control of the way they behaved during contractions’. Again there was no statistical difference between the trial arms for these questions.

4.7.1.6. Level of Intervention in Labour (Question 15)

Question 15 asked women how they felt about various interventions they may be offered in labour. For all the interventions a greater percentage of women in the ‘preference arm’ than in the RCT arm ‘definitely did not’ want to experience the intervention: continuous fetal heart monitoring - 25% ‘Preference arm’ women compared with 7% in RCT arm; episiotomy – 20% ‘preference arm’ compared with 8% in RCT arm; induction of labour – 15% ‘preference arm’ compared with 10% in the RCT arm.

4.7.1.7. Hopes and Expectations for Labour

Women were asked about a couple of topics to assess their hopes and expectations for labour: whether childbirth will be a fulfilling experience, midwifery staffing.

4.7.1.7.1. Whether Labour will be a Fulfilling Experience

Women were asked two questions about whether they felt it was important to have a fulfilling experience or expected that labour would be a fulfilling experience:

> Question 41*: How important is it to you that giving birth will be a fulfilling experience?*
>
> Question 42*: Do you expect giving birth will be a fulfilling experience?*

Slightly more women in the 'preference arm' (*n* = 18; 90%) hoped that labour would be a rewarding experience compared with 85% (*n* = 47) in the RCT arm (Question 41). Thirteen percent (*n* = 8) of the women in the RCT arm felt it was 'not very important' and one woman (5%) in the 'preference arm'.

In answer to Question 42, 78% (*n* = 47) in the RCT arm expected that it would be fulfilling and 75% (*n* = 15) in the 'preference arm'. However, a higher percentage of women in both trial arms 'didn't have any expectations' – 18% (*n* = 11) in the RCT and 20% (n = 4) in the 'preference arm'.

There was no statistically significant difference between the trial arms for hope that birth would be fulfilling ($p = 0.893$) and the expectation ($p = 0.863$).

4.7.1.7.2. Midwifery staffing and Birth Companion

Women were asked six questions about midwifery staffing and two about the presence of a birthing partner. The women's responses are given in Appendix 9. There were no significant differences between the trial arms regarding:

- Expectations and wanting a midwife who the woman had already met (Questions 23 and 24).
- Having the same midwife throughout labour (Questions 25 and 26).
- Numbers of people coming in and out of the room (Questions 27 and 28).
- Presence of a birthing partner (Questions 29 and 30).

4.7.1.8. Pain in Labour

There was no difference between the groups concerning their anxiety about the pain of labour ($p = 0.21$), using breathing and relaxation exercises ($p = 0.21$) or deciding on other methods of pain relief such as music ($p = 0.95$).

4.7.1.9. Previous Experience

The final question (Question 43) provided women with an opportunity to explain any previous experiences which might impact on their hopes and expectations for the labour by the use of an open-ended question.

Thirteen women in the RCT and four women in the 'preference arm' did provide some brief comments on previous experience. Their comments were coded into five categories and are listed in Table 4.3.

Table4.3: Illustrates the comments women provided to explain factors which may impact on their forthcoming childbirth experience: *n* (%)

Comment Categories	RCT Arm *n* = 13 (22)	'Preference Arm'* *n* = 4 (20)
Previous negative childbirth experience	5	0
Previous enjoyable experience	2	2
Hearing of other women's experiences	2	0
Expectations following parentcraft classes	3	0
Want drug free labour	1	3
Staffing - hope to be delivered by community midwife	0	1

* more than one response per woman

The majority of women did not provide any comments: 78% of women in the RCT arm and 80% in the 'preference arm'. This is one draw back of using open questions.

Additional information obtained from the antenatal questionnaire which has not discussed here can be found in Appendix 9.

4.7.2. Post-Labour Satisfaction Questionnaire

This section of the thesis explains the results of the numbered scale women were asked to complete soon after the birth of their baby.

The results for women's satisfaction with their childbirth experience demonstrated no significant difference between the RCT groups: with a mean of 4.32 [SD 1.20]

for the women randomised to the waterbirth group and 4.29 [SD 1.26] for the women randomised to a land birth ($p = 0.94$).

When comparing the scores of the women in the RCT arm with the women in the 'preference arm' there was no significant difference between the trial arms ($p = 0.58$). However, the women in the 'preference arm' land birth group had the lowest satisfaction score of 3.78 [SD 0.97] compared with 4.50 [SD 0.55] in the waterbirth 'preference arm' which was the highest score for both trial arms.

The next section will now provide the results of the questionnaire which women were asked to complete six weeks after the birth.

4.7.3. Results of the Postnatal Questionnaire

The questionnaire was sent to a woman in the post a few days before her baby was six weeks old. Seventy-nine questionnaires were sent out and the return rate was 100%. This would indicate that women were still willing to provide further information to the study some weeks after their childbirth experience. Only four women had to be sent reminders: two in the RCT arm and two in the 'preference arm'.

4.7.3.1. Emotions

Women were provided with a list of 16 descriptive words and asked to circle the words which they felt appropriate to their baby (Question 73). The women's responses are shown in Table 4.4.

Table 4.4: The Descriptive Terms About Their Baby Provided to Women and the Number of Women in Each Trial Arm Who Chose Each Term

Responses *	**RCT(*n*=59)**	**Preference Arm (*n*=20)**
	***n* (%)**	***n* (%)**
Placid	21 (35.6)	6 (30)
Responsive	44 (74.6)	15 (75)
Grizzly	10 (16.9)	2 (10)
Talkative	21 (35.6)	7 (35)
Alert	52 (88.1)	18 (90)
Stubborn	11 (18.6)	3 (15)
Fascinating	38 (64.4)	11 (55)
Angry	1 (1.7)	0
Demanding	25 (42.4)	6 (30)
Cuddly	42 (71.2)	13 (65)
Exhausting	12 (20.3)	2 (10)
Fretful	3 (5.1)	0
Unresponsive	0	0
Draining	3 (5.1)	1 (5)
Determined	11 (18.6)	3 (15)
Contented	31 (52.5)	14 (70)

* May be more than one response per woman

It can be seen that women in the RCT arm gave more responses than in the 'preference arm' which could be construed as negative comments about their baby: grizzly, angry, exhausting, fretful and demanding. However, they also gave more responses generally compared with the 'preference arm' women and a greater number thought their baby was 'placid', 'fascinating' and 'cuddly'. Therefore, it is difficult to compare the two groups and draw meaningful conclusions.

4.7.3.2. Information and Knowledge

Women were asked about the amount of information they had been given in pregnancy. The majority of women in both groups felt that 'the right amount of information' was provided: 49 (83.1%) women in the RCT and 15 (75%) in the 'preference arm' ($p = 0.48$).

4.7.3.3. Decisions in Labour

4.7.3.3.1. Birth Plan *(Question 2, 3, 4)*

One surprising finding was that the majority of women in both trial arms did not complete a birth plan and that only one additional woman in each arm wrote a birth plan between recruitment and labour. There was no significant difference between the trial arms in the number of women who completed a birth plan: 20 (33.8%) in the RCT group and 6 (30%) in the 'preference arm' ($p = 0.75$).

Women were asked to state the advantages of writing a birth plan. Thirteen (22%) women in the RCT arm provided positive comments, explaining that staff were informed of their wishes by referring to the birth plan. No women in the 'preference arm' gave any advantages. When asked for their thoughts on the

disadvantages of writing a birth plan, some women in both trial arms felt that the birth plan was not followed or that staff did not take any notice of it.

4.7.3.3.2. **Non-Emergency Decision-Making** *(Question 59)*

There were no differences between the two trial arms regarding who made the decisions in labour (p = 0.27). The majority of women in both groups felt that the midwives discussed issues with them before arriving at a decision (43.1% in the RCT arm and 30% in the 'preference arm').

4.7.3.3.3. **Emergency Decision-Making** *(Question 58)*

The majority of women in the RCT (*n* = 30, 51.7%) and 'preference arm' (*n* = 12, 60%) felt that this question was not applicable because an emergency situation had not arisen during their labour. Two (3.4%) women in the RCT arm thought that they had been in control of the situation, when there was an emergency, compared with no women in the 'preference arm'.

4.7.3.4. Control

4.7.3.4.1. Coping with Contractions *(Question 64 and 65)*

There was no significant difference between the groups for feeling in control during contractions (p = 0.40) or their feeling about loss of control during labour (p = 0.70).

4.7.3.4.2. Assertiveness during Labour *(Question 60)*

There was no difference between the groups when examining women's feelings of control over the care which staff provided during labour (p = 0.83). However, three (5%) women in the RCT group compared with three (15%) in the 'preference arm' felt that they had 'no', or 'hardly' any control over staff actions, which was a surprise finding. It was expected that the 'preference arm' women would exert more influence over the care they received.

4.7.3.5. Level of Intervention in Labour

One statistical difference between the groups was that more women in the RCT arm reported that they were given drugs to start their labour (n = 12, 20.3%) compared with none in the 'preference arm' (p = 0.03).

There was no difference between the groups for episiotomy, augmentation of labour, continuous fetal monitoring or instrumental delivery.

4.7.3.6. Hopes and Expectations

4.7.3.6.1. Was the Birth a Fulfilling Experience? *(Question 70)*

When comparing the satisfaction of the women in the RCT arm and the 'preference arm' there was a significant difference in the responses. Women were given the three options: 'Yes', 'No' or 'Unsure' to say whether they had found birth a fulfilling experience. Forty-nine women (83.1%) in the RCT group stated that 'Yes' they had found birth to be a fulfilling experience as against 10 women (50%) in the 'preference arm' (p = 0.003).

4.7.3.6.2 Midwifery Staffing *(Question 50, 51, 52, 53, 54, 55, and 56)*

There was no difference between the groups for:

- Thoughts about the number of staff coming into their room during labour (p = 20).
- The number of midwives coming into their room during labour (p = 0.33).
- Having met the midwife or midwives caring for them during labour (p = 0.33).
- Or one-to-one care in labour (p = 0.71).

Women also reported that staff were available when required and there was no evidence from either group that women found midwives were intrusive during labour.

One statistical difference between the groups was that more women in the RCT arm were seen by a doctor (n = 33, 55.9%) compared with six women (33.3%) in the 'preference arm' (p = 0.03). However, this is not a surprise because more women in the RCT were induced or had an instrumental delivery so required care from a doctor.

4.7.3.7. Pain in Labour

4.7.3.7.1. **Expectation for Level of Pain in Labour** (Question 5 and 6).

A similar percentage of women in both trial arms felt that the pain was 'not at all' as they had expected: 14 women (23.7%) in the RCT arm compared with 4 women (20%) in the 'preference arm'. A further group of women felt that the pain was as expected in some ways but 'not in others': 32 in the RCT and 11 in the 'preference arm'. Of these women, 52.5% (*n* = 31) in the RCT and 55% (*n* = 11) in the 'preference arm' reported that the pain was 'much more painful' or 'more painful' than expected. Twelve RCT women (20.4%) reported that the pain had been 'exactly' as expected which was similar to the five women (25%) in the 'preference arm'.

4.7.3.7.2. **Methods of Pain Relief**

There were no differences between the two groups regarding the different methods of pain relief used during labour or their effectiveness.

Women who achieved a waterbirth were asked whether they would choose another in a future pregnancy. All the women in the 'preference arm' reported that they would do so compared with 52.4% of women in the RCT arm. Women

who left the pool during labour were asked whether they would like to use the birthing pool for pain relief in a future labour: 90% RCT women and 100% 'preference arm' women said 'yes'.

Women who were allocated a waterbirth in either trial arm, and did not achieve this, were asked to explain why. The comments are provided in Table 4.5.

Table 4.5: Provides the comments provided by women to explain why they were unable to achieve a waterbirth.

Comments	RCT(*n*=59) *n*	Preference Arm (*n*=20) *n*
Unsure why I couldn't use pool	2	0
Long labour	5	0
Meconium-stained liquor	4	1
Midwifery problem		
Short of staff	2	1
No waterbirth qualified staff	2	0
Labour too quick/pool took long time to fill	3	0
Pre-labour rupture of membranes needed induction of labour	2	0
Did not relieve the pain	2	0
Pool occupied	2	0
Complications in labour	1	2
Advised risk of infection by medical staff	2	0
Breech	0	1
Left pool. Did not want to return	1	0
Too scared to use pool when in labour	1	0
Required induction of labour	2	0
Pyrexial in labour & advised epidural	1	0

4.7.3.8. Breastfeeding

A greater number of women in the 'preference arm' breastfed their babies (*n* = 15, 75%) compared with the RCT arm (*n* = 28, 47.5%). The reason for this is unclear.

4.7.3.9. Neonatal Problems in First Six Weeks

There was no difference between the groups for reported neonatal health problems ($p = 0.56$).

Additional information obtained from the postnatal questionnaire, which has not discussed here, can be found in Appendix 12. A final section in the questionnaire asked women who participated in the RCT arm six additional questions to obtain their thoughts about joining the study. Their responses will now be discussed.

4.7.4. Women's Thought about Participating in the RCT Arm

4.7.4.1. Did Participation Affect the Birthing Experience?

The first question asked:

> *Do you feel that by participating in the randomised controlled trial this affected your birthing experience?*

Women were also asked to explain their answer.

Eighty-eight percent (*n* = 52) of the women said it did not affect their birthing experience, two women did not answer the question.

However, five women (8%) replied that joining the study had affected their birthing experience. Three felt it was a positive effect, one because she was randomised to water and needed less pain relief than she had anticipated. The second woman stated that:

> *'I would never have thought of a waterbirth and it was fulfilling to provide information for others. I was happy to help' (Participant 24)*

Another, who was randomised to a land birth, stated:

> *'It gave me the opportunity to meet, get to know and trust a midwife that cared for me while I was in labour'. (Participant 6)*

Participant 9 wrote that her allocation to a landbirth did not cause upset during labour or for the birth:

> *'I felt that I could not deter from a landbirth, but during the delivery I was not unhappy'*

However, two women felt that there was a negative effect on their birthing experience. Both women had been randomised to water and their disappointment was linked to midwives. The first women said:

> *'No-one on staff-wise was qualified to supervise a waterbirth. I had so much wanted to be able to have a waterbirth …or at least use the pool for relaxation and pain relief. I was very disappointed I wasn't able to use it'. (Participant 47)*

The second woman found midwives on duty were reluctant to 'allow' her to use the pool:

> *'Staff were negative about pool use saying it is a dirty messy business'. (Participant 10)*

Another woman randomised to water felt that she was only able to use the pool because she was aware that a group of midwives was on-call to support women who participated in the waterbirth study, in case staffing shortages meant that women were unable to enter the pool. She wrote:

> *'Midwives said I could not use the pool because no midwives were available to support me. I asked them to ring one of the midwives who were on-call for the study. They refused. I then asked them to give my husband the numbers. They then reluctantly agreed to phone a midwife who came in. The midwives did not appear to support waterbirths and did not support the study. I think you need to know this'. (Participant 5).*

A fourth woman stated that she was happy with how her labour went but was:

> *'was very disappointed when I couldn't use the pool because there wasn't a midwife available' (Participant 10)*

The 52 women who felt that participation did not affect their birthing experience were asked to explain the answer they had given. Twenty-two women (56.4%) did not provide a response. The explanations given by the other women are provided in Table 4.6.

Table 4.6: The responses given by women to explain why joining the RCT did not affect birthing experience.

	Number of Women *
Happy with either a waterbirth or a land birth	15
Did not receive different care from other women	6
Wanted water and randomised to water	4
Happy to help provide information	4
No pressure to go into study, discussed thoroughly with midwife	4
Depends on 'circumstances on the day', not guaranteed use of Pool therefore happy to participate	4
All I cared for was a healthy baby, I was happy with trial care	2
No woman can be sure of outcome of labour	1
No reason given	2

* Some women gave more than one answer

4.7.4.2. Participation in a Similar Study

Women were asked:

Would you participate in a similar study again?

The majority of women (88.1%, n = 52) said that they would. Two women (3.4%) did not give a response, another two said they were 'unsure'. Two women (3%) said they would not join a similar study. One woman (Participant 45) gave the reason as '*I won't be having any more pregnancies so the question is not applicable to me'.* The other recruit did not explain why she had made that decision.

Women were asked to explain their response to the question. Most women gave positive comments when asked to explain why they would be willing to join another study:

> *'I felt if I could help in any way there was no reason not to get involved. (It was a fulfilling thing to do)' (Participant 6).*

> *'It (the waterbirth) was the most wonderful experience. It was the best of my three births. Thank you for asking me to join your study. I would not have thought of a waterbirth otherwise' (Participant 33)*

> *'I found it exciting to participate in a research project'. (Participant 10)*

> *'If I can help other women and babies by doing something count me in. There was nothing sinister in It'. (Participant 57)*

> *'Randomising made it special for me' (Participant 44).*

The responses from the women explaining why they would join a similar study in the future were coded, and the themes obtained are listed in Table 4.7.

Table 4.7: The Responses Given by Women to Explain Why They Would Participate in a Similar Study Again.

	Number of Women *
Happy to help provide health information	14
Want to help future parents	11
To support research	10
Research is good as it provides more information (*n* = 8)	
Research improves care so more mothers should join studies *(n* = 2)	
Did not interfere/change anything	8
To help midwives	6
Want to improve the experience of childbirth for future women	5
Fulfilling/exciting to participate	4
Helped me to get desired birth (trial midwife available to support waterbirth)	3
To help future babies	3
Still would not mind either method	3
Built up a relationship with a midwife who was at the birth	2
Nothing sinister/worrying about joining a research project	2
No pressure to take part so was happy to do so	2
Did not cost me anything	1
No reason given	6

* Some women gave more than one response

4.7.4.3 Women's Thoughts on the Amount of Information They Were Asked to Provide

Women were asked whether they were overburdened with the amount of information they had needed to provide to the researcher. Most women (*n* = 56, 94.9%) answered 'no'. One recruit stated she did not mind that the data were being collected:

> *'Although tests or samples were being taken during the birth/labour, these made no difference to myself or*

to my partner. We were not put out by this. Thank you for allowing myself and my partner to be a part of your pilot study.' (Participant 03)

Other recruits explained:

'Nothing sinister about it so happy to help medical research' (Participant 23)

'Research is needed to change care. It was my first baby but I noticed nothing unusual and had nothing to compare with. I felt no pressure to take part and would say yes again. (Participant 39)

4.7.4.4. Women's Thoughts about Providing Information for the Future

Women were also asked how they felt about the study results being used to provide information for future parents and healthcare professionals. The majority of women (*n* = 57; 96.6%) felt that it was 'very important' or 'important'. Only one woman said it was 'unimportant'.

4.8. Discussion

The study reported in Chapter 3 was the first RCT to allocate women to either a waterbirth or a land birth. As the purpose was to investigate the feasibility of a larger RCT, the trial design incorporated a 'preference arm' so that outcomes of the women in the RCT could be compared with women who participated in the 'preference arm' investigating expectations for childbirth and satisfaction after the event. It is acknowledged that the questionnaires used in this study were

compiled using questions from a previous large survey which examined women's expectations for childbirth (Green et al., 1998a) and were not validated for the waterbirth study. However, this was necessary because the NHS Trust, which funded the waterbirth study, specified a short time frame for completion and write-up of the research: 12 – 18 months. The questions which were chosen from the survey were also exactly what were required to assess women's expectations. Therefore, obtaining permission to use questions from a previous survey (Green et al., 1998b), enabled the study to be completed within the time requested by the funding body, which was an important consideration, and also the questions were ideal for the aims of this study. It is also acknowledged that the study was underpowered and so the results are potentially biased. However, no-one has previously investigated whether pregnant women who accept randomisation, have different characteristics and expectations compared with those who definitely make a choice to have the intervention. Therefore, although small, this study has provided some new information about RCT trial participants.

Many of the uncertainties and concerns about organising a waterbirth RCT related to users of the maternity services, - for example, would women recruit to a study that would randomly allocate them to a waterbirth or land birth? This study would indicate that women did seem willing to participate. Most, even if very keen to use the pool, appreciated that they could not be guaranteed it would be available when they were in labour. Many, who had not considered using the birthing pool, were happy to participate to help provide evidence for other parents and healthcare professionals and therefore were willing to be randomised to

either a water or land birth. In the postnatal questionnaire many women explained that they were '*given the same care*' and that participation '*made no difference'* to the care they had. A large percentage of women (88%) stated that they would participate in a similar research study. Some women perceived it was a 'fulfilling' experience to help obtain information for other women.

One woman was withdrawn from the study by a midwife who felt it was inappropriate to discuss the study when the woman was distressed due to labour pain. Five women noted that midwives did not appear to support their decision to use water as a method of pain relief. One woman randomised to water reported that midwives had been obstructive to her desire to have a waterbirth. She and her husband had to be very insistent with midwives before a midwife was contacted to support her in the pool. It also became evident that some midwives did not seem keen to collect the research samples, the reason for this is unclear. Previous research by Hicks (1995) identified that midwives rated results from medical research more highly than results from midwifery research so this lack of complicance may indicate that midwives in a district general hospital are still reluctant to support midwifery research.

Another concern raised in relation to a RCT was whether women's satisfaction with their birthing experience would be affected by the fact they themselves did not decide whether to use the pool (Jowitt, 2001). The results of this study would indicate that randomisation does not affect women's satisfaction as no statistical difference was found between the scores of the women who joined the

'preference arm' and those in the randomised arm. It was expected that women who had joined the 'preference arm' would have a higher score than women who randomised and that women who randomised to land might be disappointed and have the lowest score. However, the mean score for women in the 'preference arm' for land was lower (3.78) than women randomised to land (4.24) indicating that feelings of satisfaction may involve more than just ability to choose.

Opponents of a RCT (Garland & Jones, 1994; Torgerson & Sibbald, 1998; Jowitt, 2001) have stated that by randomising women they are denied the chance to decide themselves whether or not to use the pool. As a consequence, they fear that women will find their childbirth experience is less fulfilling. The results of the waterbirth study postnatal questionnaire would seem to refute this concern. A statistically significant number of women in the RCT arm reported that they found childbirth a fulfilling experience compared with the 'preference arm' (p = 0.003). This was a surprise finding and it was reassuring and an achievement to obtain this significant result which hopefully will allay the fears of other healthcare professionals.

Critics of a RCT state that the results are not generalisable because women with a strong preference to use the intervention which is being evaluated (waterbirth), i.e. the 'normal' pool users, would decline randomisation (Peat, 2002). However, there was no evidence that women in the 'preference arm' expressed stronger expectations for childbirth. Another potential source of bias is that if women with strong preferences are randomised and do not achieve their preferred choice,

they may not comply with the allocation or may withdraw from the trial (Bradley, 1993). Only one woman who was randomised to 'land' achieved a waterbirth and she reported that the midwife who admitted her to labour ward 'misunderstood' the allocation and that she herself was surprised to be 'told' to enter the pool. One woman, who was randomised to water, admitted that she was 'too afraid' to use the pool when she was in labour.

There was a 100% return rate for the six-week follow-up questionnaire – this would seem to suggest that women continued to support the study. Most women stated they would be willing to join a similar study again and gave positive comments about participating.

It is claimed that women who are prepared to be randomised may not be representative of the 'usual' women who would ask for a waterbirth. However, the results from these questionnaires do not show any differences in characteristics between the recruits participating in the two trial arms. Therefore, this would suggest that the results from a future large RCT would be generalisable to all women.

4.9. Conclusion

The results from this study appear to demonstrate that women are willing to participate in a waterbirth research project despite the concerns held by

healthcare professionals. Data obtained from the antenatal and postnatal questionnaires demonstrate few differences in expectations for childbirth when comparing women in the RCT and 'preference arm'. The results of the questionnaires also indicate that randomisation did not affect women's satisfaction with their birthing experience either immediately after the birth or six weeks later. No detrimental effects on womens' childbirth experience were identified. These results indicate that it would be possible to undertake a multi-centre RCT without having a detrimental impact on women's hopes and expectations for their childbirth.

Critics of undertaking a waterbirth RCT say that such a trial would be contrary to the ethos of care linked with a waterbirth (Garland & Jones, 1994). However, a greater percentage of women who participated in the RCT found childbirth to be a fulfilling experience compared with women in the 'preference arm'. It may be that the women's responses to participation and randomisation were positive because they perceived that they were providing information to make childbirth better for other women. Through this altruistic behaviour, it would appear that women achieved an additional sense of empowerment/fulfilment which was not dependent on the childbirth outcome. Most women also responded positively when asked whether they would join a similar study again and felt that providing the information was not onerous.

One important factor which is known to affect a women's satisfaction with pregnancy and childbirth is the relationship she develops with caregivers (Smith et al. 2009). Unfortunately, some comments from women suggest that not all midwives support the choice of water as a method of pain relief and this had an influence on the women's care during labour. In view of the RCM (2000) statement that waterbirths fall within the duty of care of a midwife these findings need further investigation.

The next part ot this thesis describes a study which investigates midwives' attitudes towards waterbirths.

THE CHALLENGE OF CONDUCTING A WATERBIRTH RANDOMISED CONTROLLED TRIAL

PART 2

MIDWIVES' ATTITUDES TO WATERBIRTHS: A Q METHODOLOGY STUDY

CHAPTER 5: PREPARATION FOR THE Q METHODOLOGY STUDY

The purpose of this chapter is to describe Stage 1 of a secondary study which was carried out to investigate midwives' experiences and views of waterbirths using Q Methodology. This chapter will explain why the study was undertaken, the strengths and weakness of Q Methodology and the processes followed to develop the Q concourse (Thematic network analysis of 13 papers, semi-structured interviews with 5 midwives, development of the Q concourse, preparation for the Q Sort, pilot of the Q Sort). Chapter 6 will provide information about the final stages of the Q Methodology study (Selection of the P Set, administration of the Q Sort, analysis and results).

5.1. Introduction

The results of the Waterbirth Study (Chapter 3) demonstrated that a disappointing number of women achieved the waterbirth randomisation allocation. Many did not even enter the pool when in labour. When the women's postnatal questionnaires, completed for the waterbirth study, were analysed (Chapter 4), it was noted that some women commented that the midwives providing their care did not appear to support their decision to use the birthing pool.

The intention of this secondary study was to gain an insight into individual midwives' views and experiences of waterbirths as these may have an impact on the number of waterbirths undertaken and choice for women. A similar study had not been undertaken prior to this study. Since undertaking this work, two other studies have been published which investigated this topic (Russell, 2011; Meyer et al., 2010).

5.2. Research Question

This research study was undertaken to answer the question:

What are midwives' experiences and views of waterbirths?

The next section will explain the study processes.

5.3. Methodology

Q Methodology was chosen to investigate and develop a greater understanding of midwives' attitudes and experiences of waterbirths because, as Barker (2008) states, Q Methodology provides an 'opportunity to examine the participant's point of view'. Q Methodology is often used to explore complex, sensitive concepts and subjects (Watts & Stenner, 2005).

Q Methodology was first devised by William Stephenson in 1935 as an innovative way of conducting behavioural research designed to answer questions that focus on individual or group beliefs and attitudes, in other words, subjectivity (McKeown & Thomas, 1988, p. 11).

Q Methodology is based on two principles. Firstly, that subjective points of view are put forward from a 'position of self-reference' (McKeown & Thomas, 1988, p. 12), as opposed to seeking objective definitions or tests. Secondly, the subjective points of view can be voiced to others (McKeown & Thomas, 1988, p. 12). Q Methodology allows the views and ideas of individuals (the participants) on a researched topic to be examined from the internal standpoint of the individuals themselves (McKeown & Thomas, 1988, p. 12) by the way in which they sort a number of statements. Brown (1986, p. 58) stated that:

> *'only subjective opinions are at issue in Q and although they are typically unprovable, they can nevertheless be shown to have structure and form, and it is the task of Q technique to make this form manifest for purposes of observation and study'.*

Stephenson (1953) suggested that instead of applying tests to a sample of people, the people should be applied to a sample of statements. Each statement is 'an expression of an individual opinion' (Webler et al,. 2009) and subsequently these statements are analysed to reveal patterns in the way the participants think, which can be described as 'social perspectives' (Webler et al., 2009) or 'voices of

the participants' (Brown et al., 2007). Q data are amenable to numerical analysis to produce the opinion profiles.

Stainton Rogers (1995) states that the range of topics which can be investigated using Q Methodology 'is almost unlimited'. Q Methodology has been used by researchers to examine mental health nurses' knowledge (Barker, 2008), patients' understanding of irritable bowel syndrome (Stenner et al., 2000) women's experiences of enduring postnatal perineal and pelvic floor morbidity (Herron-Marx et al., 2007) and to investigate the social identities of smokers (Farrimond et al., 2010). Therefore, Q Methodology was felt to be an appropriate research method to explore midwives' thoughts and attitudes towards waterbirths.

5.3.1. Q Methodology Stages

There are four distinct stages in a research project using Q Methodology (Corr, 2001) which are illustrated in Table 5.1.

Table 5.1: The Q Methodology Stages

Stage 1:

- Development of the Q sort pack.

  This is a collection of statements, which reflect what people say or think about the topic being investigated. A large group of statements are generated: the Q concourse. This concourse is reduced to develop the Q set, or Q sample.

Stage 2:

- Administering the Q sort.

The participants (P set) sort and rank the Q set according to their views, using a Q sort grid.

Stage 3:

- Data entry and analysis.

Data is analysed using statistical tests: correlation, factor analysis.

Stage 4:

- Interpretation.

The emergent factors are compared and contrasted.

(Corr, 2001).

5.3.2. Strengths of Q methodology

Q Methodology investigates subjectivity and is therefore particularly well suited to researching sensitive topics and other ethical issues (Kitzinger, 1986). It also allows exploratory research when there is little previous research evidence on a topic of interest (Thomas & Watson, 2002) which is applicable to the topic of this study.

Webler et al., (2009) liken Q methodology to discourse analysis but say that Q has advantages over other discourse analysis techniques because 'participants' responses can be compared in a consistent manner' because all the P set (participants) are 'reacting to the same set of statements'.

In emphasising the importance of subjectivity, Q methodology has some features in common with qualitative research methodologies; however, the data are analysed using statistical tests to identify the themes which emerge. Brown (1996) has described Q methodology as building a bridge between qualitative and quantitative research methodologies.

One of the advantages of using Q Methodology is that a small number of participants, even one respondent, can provide significant research results (Brown, 1991). As Brown (1991) states, the focus is all on quality rather than quantity. Participants do not need to be randomly selected (Thomas & Watson, 2002), but they should have knowledge or experience of the subject under investigation. Q methodology also allows the voices of the minority groups as well as the dominant ones to be heard (Stainton Rogers, 1995).

Q methodology is a research method which can be administered over the internet (Thomas & Watson, 2002) which may help to limit costs and reach a wider participant group. Another option to reach a wider audience, is for the Q sort to be carried out by participants as a 'self-completion exercise' (Stainton Rogers,

1995). Another benefit is that analysis can be undertaken using PQMethod (Schmolck, 2002) which is a freely available computer package which can be downloaded by researchers.

Q Methodology allows others to go back to data and work through the analysis themselves, thereby checking the researcher's interpretation (Thomas & Watson, 2002)

5.3.3. Criticisms of Q methodology

Some critics say that a Q sort can be time-consuming (Watson et al, 2008) and it is difficult to administer to a large number of participants (Polit & Beck, 2012, p. 304). The task may be beyond the comprehension of some participants (Bolland, 1985). Therefore, Q Methodology may only be suitable for studies involving a small number of participants (Watson et al., 2008). Another criticism is that by forcing participants to sort according to a researcher's predetermined grid prevents them from expressing their own views and may lead to frustration (McKeown & Thomas, 1988, p. 34).

There are concerns from critics that the creation of the Q set is open to researcher bias and may therefore affect the interpretation of any project (Stainton Rogers, 1995). Q Methodology can reveal subjective perspectives on

the topic of investigation but cannot predict how widely these views are held (McKeown & Thomas, 1988, p. 24).

Researchers may find that not all Q sorts load on to a Factor if the views of participants do not match those of others completing the Q sort (McKeown & Thomas, 1988, p. 15). In other cases, some Q sorts may load on to more than one Factor which is said to be 'confounded' (Akhtar-Danesh et al., 2008). In these circumstances the Q sorts are excluded from any further analysis. Secondly, there may be positive or negative significant loadings for a single factor. In this case it is known as 'bipolar' which 'implies that two opposite viewpoints representing two groups of participants loaded significantly on the same factor' (Akhtar-Danesh et al., 2008). This demonstrates that one group has a different opinion from the other group.

The analysis of Q sorts is carried out by mathematical factor analysis and so combines a qualitative method of data collection with a quantitative method to obtain results which may deter some qualitative researchers (Webler et al., 2009). The interpretation of the findings may also be liable to bias as the selection of Factors is decided by personal judgement of the researcher (Corr, 2001).

5.4. Ethical Approval and Consent

Ethical approval for the semi-structured midwifery interviews (Appendix 13) and the Q sort (Appendix 17) was sought and obtained from the University of Birmingham Research Ethics committee before recruitment of the midwives was commenced. As this research was not undertaken in the National Health Service, ethical approval was not sought from the National Research Ethics Service (NRES). The researcher did consult NRES to ask whether ethical approval was required as midwives would be participants because of the nature of their work within the NHS. However, NRES stated that ethical approval was not required but advised the researcher to check with the researcher's NHS Trust Research and Development Centre (R & D). When the Trust R & D was consulted, it did not require ethical approval because recruitment was to be undertaken outside the NHS and midwives would not be completing the interviews or Q sort within their work time.

Midwives were given an information sheet (Appendix 14 & 18) and a chance to ask any questions. Written consent was obtained from the participants by the researcher. Two copies of the consent form (Appendix 15 & 19) were signed, one copy being retained by the researcher and the other by the participant. All midwives were aware that participation was voluntary and that they were free to withdraw at any time without giving a reason. Midwives were also informed that participation would have no implications for their employment.

All information collected was kept strictly confidential. All paperwork was anonymous, except for the consent forms which were kept separately from the Q sort paperwork. All electronic data was password protected. Midwives were also assured that they would not be identified in any report, publication or presentation.

5.5. Research Process

The explanation of the research study is structured around the chronology of the methods employed in this research to explain the processes, the data collection and interpretation of the findings. The research project is explained in the four Q Methodology stages which are illustrated in Table 5.2.

The first stage was development of the Q Sort pack which involved a thematic network analysis (Attride-Stirling, 2001) of a literature review examining midwives' attitudes to change in practice. The themes obtained were then used to create a semi-structured interview schedule. The interview notes were subjected to thematic network analysis (Attride-Stirling, 2001) in order to confirm that the themes obtained from the literature review were applicable to waterbirths and also to investigate whether new themes would emerge from interviews with midwives. The preparation for the Q Methodology work was undertaken by constructing statements using the thematic network analysis of the literature review and semi-structured interviews. Pilot work was undertaken to identify any

mis-leading or badly constructed statements. This first stage is explained in this chapter.

The second stage of the study was to identify suitable midwives (Q Set) and administer the Q Sort. Stages 3 and 4 involved data analysis and interpretation of the results. Stages 2 – 4 are explained in Chapter 6.

Table 5.2: The Four Stages of the Study Investigating Midwives' Views and Experiences of Waterbirths and the Methods Employed to Obtain the Data.

Stage 1: Development of the Q sort pack

- **Literature review (Chapter 5)**

Literature review investigating midwives' attitudes to, and experience of, the introduction of new practice or service reorganisation
Thematic analysis of 13 research papers

- **Semi-structured interviews and analysis (Chapter 5)**

Development of an interview schedule for semi-structured interviews with midwives
Face-to-face semi-structured interviews
Coding of interview field notes
Thematic analysis

Q Methodology preparation (Chapter 5)
Construction of Q sort statements and instructions
Piloting of Q sort statements and paperwork

Stage 2: Administration of the Q sort (Chapter 6)
Identification of P set
Q sort data collection

Stage 3: Data entry and analysis of Q Methodology (Chapter 6)
Analysis of demographic data by SPSS vs 17.0
Analysis of Q sort grids using PQMethod vs 2.11

Stage 4: Interpretation of the results and conclusions (Chapter 6)

This chapter will now report the first phase of the study: Development of the Q sort pack.

5.6. Stage 1: Development of the Q Pack (Concourse and Q set)

The Q pack was constructed by thematic analysis of a literature review and semi-structed interviews with midwives. The literature review process will be reported in the next section.

5.6.1. Literature Review

As there is very little robust evidence available about midwives' attitudes towards waterbirths, information was initially collected from academic literature looking at midwives' experience and response to the implementation of new practices and reorganisation of their working lives.

5.6.1.1. Aims of the Literature Review

The aims of this literature review were to:

I. Identify research studies which looked at midwives' responses to organisational changes and implementation of new clinical practices.
II. Review the studies and to summarise their findings.
III. Gain an understanding of the factors which affect midwives' attitudes and responses to change.

IV. Inform the themes for the design of a semi-structured interview schedule to obtain information from midwives on their attitudes to waterbirths.

V. Ensure that the questions for the semi-structured interviews have construct and content validity.

VI. Inform themes for the Q Methodology research stage.

5.6.1.2. Literature Review Methodology

In order to fulfil these aims, various strategies were employed to obtain relevant journal articles concerning the implementation of new clinical midwifery practices and maternity service re-organisation which concentrated on the views of midwives. The literature search followed the process outlined by Aveyard (2007).

5.6.1.3. Search Terms

A combination of free text, thesaurus and MESH terms was used. Search terms used were: waterbirth, water birth, water immersion, birthing pool, midwi*, attitude, maternity service, organisational change, practice, Changing Childbirth, natural childbirth, professional change, resistance, barriers, extended role, extended practice, alternative practice, midwife-led care, midwife led care,

midwife-led unit, midwife led unit, midwifery training, autonomous practitioner, re-organisation.

5.6.1.4. Inclusion and Exclusion Criteria

Table 5.3. illustrates the inclusion and exclusion criteria.

Table 5.3: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Research obtaining information from Registered Midwives.	Non-research papers e.g. individual midwives providing their professional opinion.
Research focusing on Registered Midwives' views and experience of the reorganisation of maternity services.	Papers reporting the views of other healthcare professionals.
Research focusing on Registered Midwives' views and experience of implementation of a new midwifery practice. To include only practices which are enhancing the role of the midwife to promote normality e.g. midwife-led care.	Papers reporting the views of users of the maternity services.
Primary research carried out since 1993.	Research which was focused on implementation of medical aspects of maternity care or extending the role of the midwife to undertake or take on tasks which were once deemed to be medical or interventions in childbirth e.g. cannulation, ventouse deliveries.
Research carried out in the UK.	Research carried out before 1993.
Papers written in English.	Research carried out in countries other than the UK.
	Non-English written papers.

The searches were restricted to research concerning registered midwives which was published in English. The articles were to be about maternity units based in the UK, to ensure applicability, and the reports reflected care and organisational changes which have occurred since 1993. The decision to commence the search in 1993 was because this is when the drive to re-organise maternity services was started, following the publication of Changing Childbirth (DH, 1993), to give midwives more responsibility and enable women to have a greater say in their care. No publication type restrictions were applied. Midwifery and nursing journals were also hand-searched for the previous five years to ensure that the

electronic search had not missed relevant articles. Five years is the time period that the Trust library keeps back issues of journals. The quality criteria for including studies were based on the Critical Appraisal Skills Programme (CASP, 2002) checklist.

Table 5.4. provides information about the databases and websites which were searched for papers in December 2007. The abstracts identified by the searches were scrutinised and all papers which appeared to meet the inclusion criteria were retrieved. The reference list of all relevant articles was also scanned to obtain additional articles which might be of interest.

Table 5.4: Illustrates the electronic databases, journals and websites searched

Electronic databases and websites searched for relevant articles
Health Databases
• Medline
• Embase
• Cochrane Database
• Health Technology Assessment (HTA)
• CINAHL
• British Nursing Index
• Database of Abstracts of Reviews of Effects (DARE)
• PsychINFO
• MIDIRS
General Websites
• Royal College of Midwives
• Web of Science
• Google Scholar
Academic Website
• EThOS
Journals
• *British Journal of Midwifery*
• *Midwifery*
• *Journal of Advanced Nursing*
• *RCM Midwives*
• *Practising Midwife*
• *Birth*
• *MIDIRS*
• *JOGIN*

Figure 5.1. illustrates the literature selection process which was undertaken to obtain the papers included in the review.

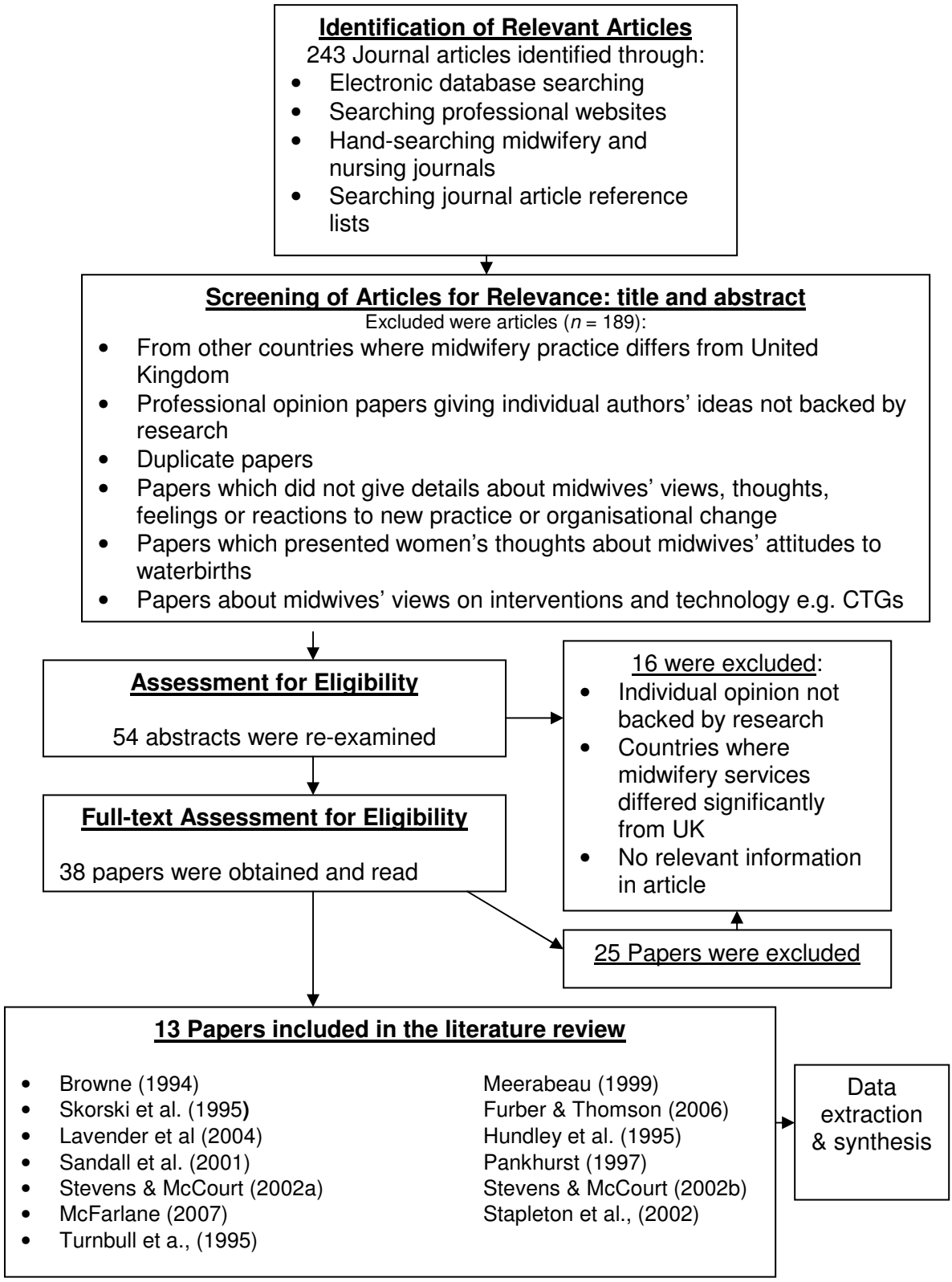


Figure 5.1: Flow Chart of Literature Selection Process

5.6.1.5. Results of the Literature Search

The search strategy generated 243 titles. After duplications were removed, 162 abstracts were read. Thirty-eight papers were obtained and reassessed against the inclusion and exclusion criteria. Eight were rejected because they involved midwifery care and research outside the UK, and another three were rejected because they were articles providing general comments on maternity services made by midwives or other commentators. The remainder were rejected because they included insufficient information about midwives' reactions to the changes (*n* = 11), they concentrated on midwives' attitudes to fetal monitoring in labour (*n* = 3) and one was rejected because it was commenting generally on a Government recommendation about maternity services.

Thirteen papers were chosen for this review. The papers looked at different time-frames of change. Two papers examined midwives' responses to proposed change before it had occurred (Browne, 1994; Sikorski et al., 1995). Two were evaluations of funded projects which involved working with the caseload midwifery model (Pankhurst, 1997; Sandall et al., 2001). Five papers examined midwives' reactions to working with different models of midwifery care (McFarlane, 1997; Meerabeau, 1999; Hundley et al., 1995; Stevens & McCourt, 2002a, 2002b; Lavender et al, 2004; Turnbull et al., 1995). The other two papers reported midwives' views on two topical aspects of midwifery practice: Baby

Friendly Initiative (Furber & Thomson, 2006) and informed choice (Stapleton et al., 2002).

Table 5.5. provides the main findings concerning midwifery attitudes obtained from the papers.

Table 5.5.: Data extraction table detailing the papers included in the review and main findings related to midwives' attitudes to change or service reoraganisation.

Area Examined	First Author (data published)	Study Question(s)	Midwife Characteristics	*n*	Data Collection Method	Findings
Midwives views about proposed Changing Childbirth recommendations	Browne (1994)	What do midwives think of the proposed changes recommended by Changing Childbirth ?	Midwives working in three districts in one regional health authority.	258 (78% of sample)	Postal Questionnaire	58% happy with current way of working 56% had positive reaction to team midwifery 30% were unsure - this group included sisters who had been qualified longer. Resources needed to be adequate. 33% felt support from managers was poor.
	Sikorski et al., (1995)	To ask midwives about proposed changes to antenatal care and alterations in the midwifery model of care which involved taking more responsibility for women by being lead professional.	Midwives working in three London hospitals. Also included views of obstetricians and GPs.	190 (76% of sample)	Postal Questionnaire	80% of midwives welcomed the changes. Felt status would be raised. Anxieties about stress levels and burn-out due to on-calls. Finances - felt would need more resources. Some wondered if reducing number of antenatal contacts was a cost-cutting idea.
Evaluation of caseload models	Pankhurst (1997)	Evalation of a caseload model of care.		37% of sample. 18 caseload midwives, 20 hospital midwives, 9 community midwives, 4 midwifery managers.	interview, participant observation, staff survey, audit.	Community and caseload midwives happier with role than hospital midwives. Negative aspects: lack of support, lack of midwifery staffing, difficulty recruiting staff to extend the scheme, need to gain labour ward experience to gain confidence and competence, difficulty with childcare, administration workload, on-calls and exhaustion due to long working hours. Midwives became more confident the longer they worked with the caseload model.

Table 5.5: Continued

Area Examined	First Author (data published)	Study Question(s)	Midwife Characteristics	*n*	Data Collection Method	Findings
Evaluation of caseload models	Sandall et al., (2001)	Evaluation of Albany Midwifery Practice model of care.	Self-employed midwives working in a self-managed group of midwives.	7	Focus groups, quesitonnaire, interviews, routine audit data and document analysis.	Midwives felt empowered by model of care. Childbirth seen as a social event. Essential factors to make service as success: - non-medicalised community based office, self-employment, choosing other team members, long holidays and 24 hour 7 days a week on-call system. Negative factors: - on-call system affecting family life, fear of litigation, hospital midwives, other midwives thinking they provided elitist service.
Alternative midwifery models of care.	McFarlane (1997)	Views of midwives piloting team midwifery.	Members of two midwifery teams piloting continuity of care	Not given	Semi-structured interviews, diaries, psychometric scores, document review	Newly appointed midwives supported changes, but midwives who had previously worked in the area found it difficult. Clash of cultures. Anticipation to reality - attitudes within teams differed as project progressed.
	Meerabeau et al., (1999)	Examined the changing role of midwives.	Stratified sample of English midwives, Supervisors of Midwives, Medical staff.	825 (75%) RMs, 170 (81%) SOMs,	Postal Questionnaire	51% of midwives felt they should take full responsibility for care of women. General knowledge of Changing Childbirth poor, Barriers to midwife-led care were: doctors and unit policies. Barriers to offering choice: fear of litigation, having to adhere to unit guidelines to protect themselves. Midwife anxiety focussed on: confidence, competencies - especially labour ward.
	Turnbull et al., (1995)	Examined the changes in midwives' attitudes to their professional role following the implementation of a midwifery development unit (MDU).	Midwives who joined a MDU were compared with a group of midwives who continued their usual work pattern	21 MDU midwives and 64 non-MDU midwives.	Questionnaires	MDU midwives experienced significant positive change in job satisfaction, but there was no change for non-MDU midwives. An area of concern was liaison with colleagues.

Table 5.5.: Continued

Area Examined	First Author (data published)	Study Question(s)	Midwife Characteristics	*n*	Data Collection Method	Findings
Alternative midwifery models of care.	Stevens & McCourt (2002a; 2002b)	Midwives views on working in a one-to-one midwifery team.	Midwives currently working in scheme. Midwives who had left scheme.	14 - current 8 - left	Ethnographic method using individual and focus group interviews.	Identification of factors which support model of care: opportunities for personal development, escaping confines of medical ethos of care, escaping hospital practices, being involved in research. Negative factors: steep learning curve, high expectations from other staff, perceptions of elitism from other staff, learning to manage less rigid boundaries, lack of management support.
	Hundley et al., (1995)	To investigate whether there are differences for the midwife's role and satisfaction with intrapartum care and delivery of women in a midwife-managed delivery suite compared with a obstetric labour ward.	Midwives in midwife-managed delivery suite and midwives working on an obstetric labour ward who cared for women in a pragmatic randomised controlled trial.	Not given	Staff questionnaire completed when each woman on trial delivered. (1748 - from Midwives' Unit, 855 questionnaires from Labour Ward)	There was greater continuity of carer in midwives' unit both during and after labour. Small difference in midwife satisfaction between areas. Midwife satisfaction was aided by autonomy and continuity of carer.
Aspects of midwifery care	Furber & Thomson (2006)	To obtain midwives' views on infant feeding and Baby Friendly iniative.	Midwives who volunteered from two units in North of England	30	In-depth interviews	Midwives reported using strategies which contravened hospital guidelines. Were aware audit of notes would identify poor practice so careful with documentation. Selective information sharing with women. Anxious about litigation but would contravene hospital policy if disagreed with policy.

Table 5.5.: Continued

Area Examined	First Author (data published)	Study Question(s)	Midwife Characteristics	*n*	Data Collection Method	Findings
Aspects of midwifery care	Stapleton et al., (2002)	Information obtained from a DH funded study to evaluate MIDIRS Informed Choice Leaflets. This paper examines midwives' strategies to deal with competing needs.	not given	Not given	Interviews	Midwives expended time and energy trying to work with women's preferences and unit management and medical demands. To avoid trouble most midwives sided with management and medical groups. Identification of horizontal violence towards midwives who did not conform. Those midwives who did support women found themselves to be in a vulnerable position and under increased surveillance over their clinical practice.
	Lavender et al., (2004)	To explore midwives' views about current system of maternity care following changes in recent years.	A purposive sample of midwives who were working in different birth settings: home, free-standing MLUs, MLUs, and traditional obstetric units.	120	15 focus group interviews	Main themes identified from midwives were: cultural changes, midwifery leadership, appropriate role models, training in normality, appropriate responsibility for care, choice for women, equity of care. Midwives wanted to practise autonomously in an environment which supported equity for women and job satisfaction for midwives.

5.6.1.6. Analysis of the papers

The analytical process was undertaken following Attride-Stirling's (2001) steps for Thematic Network Analysis which are detailed in Table 5.6. Thematic analysis involves the identification of recurrent or prominent themes in the text (Watson et al., 2008). Thematic networks then provide a method of organising, describing and illustrating the themes in a web-like framework (Attride-Stirling, 2001). Attride-Stirling (2001) emphasises that the thematic network is a method of describing the themes not the actual analysis itself.

The process of Thematic Network analysis has been used to investigate the views of first-time mothers about their postnatal care (Bailey, 2010), and the experience of breastfeeding mothers (MacGregor, 2010; Dykes, et al., 2003). It has also been used to explore parents' experience of early intervention speech therapy for their children (Lyons et al., 2010).

The use of Thematic Networks lends itself to this study because it is the identification of themes and their interrelationship which are of interest, not merely the creating of categories. In addition, it is not the frequency of the categories which is important. It is the common issues, or themes, concerning midwives' attitudes to change which the researcher needed to obtain in order to investigate midwives' attitudes to waterbirths. These themes would be used to

inform the questions for a semi-structured interview schedule to ask midwives about waterbirths. The findings from both the literature review and semi-structured interviews would be used to generate the statements for a Q Methodology concourse and eventually the Q set.

All the papers which fulfilled the criteria for the review were analysed individually using the thematic network approach, described by Attride-Stirling (2001).

Attride-Stirling (2001) describes three different levels (classes) of themes. Firstly, the Basic Themes which emerge directly from the text. These themes are then grouped with other similar Basic Themes which share a common thread to form an Organizational Theme. The third theme is the Global Theme which is created when the assertions or assumptions of the Organizing Themes are summarised (Attride-Stirling, 2001).

By proposing and explaining Thematic Network Analysis, Attride-Stirling (2001) provides a detailed method by describing the six processes involved: coding the material, identifying the Themes, constructing the thematic networks, describing and exploring the thematic networks, summarising the thematic networks and interpreting patterns. These stages are illustrated in Table 5.6.

Table 5.6.: The Six Stages which Are Undertaken in Thematic Network Analysis

1. Coding the material

The first step is systematically to reduce the written text into single words, quotations or passages of text. The development of a coding framework is devised from the salient issues emerging from the text.

2. Identification of the themes

Once the data has been coded, the abstracted themes should be generated by identifying and extracting from the coded text the noteworthy, common or significant aspects.

3. Constructing the networks

The themes are put into similar and coherent groups to form the thematic network. If only a few themes emerge on similar issues then only one network may be produced. However, if numerous themes and/or very different issues arise then multiple networks will be needed. Each network will result in one Global Theme supported by Organizing and Basic Themes. Once the network is rechecked and then finalised, these themes are represented by web-like illustrations.

4. Description and exploration of the thematic networks

The researcher returns to the original text and interprets it with the aid of the networks. Firstly, the content of each network is described with the help of words taken from the text. Secondly, the patterns which begin to emerge are identified and explored.

5. Summary of the thematic network

Once the network has been explored and described, the principal themes which characterise the network should be summarized.

6. Interpreting the patterns

The final stage of thematic network analysis brings together the deductions from the summaries of the network to explore the significant themes, concepts and patterns that arose in the text and relate them back to the original question underpinning the study.

Attride-Stirling (2001)

These six stages will now be applied to the literature obtained for this review to investigate midwives' attitudes and experiences of change to midwifery care or working practice.

5.6.1.7. Coding the Material

A coding framework of 28 items was created based on topics which had occurred regularly in the text (Table 5.7.).

Table 5.7.: Coding framework for the literature review.

Confidence
Competence
Knowledge
Benefits for women
Benefits for fetus/baby
Relationships with midwifery colleagues
Risks
Power
Medical dominance
Relationships with women
Inter-professional relationships
Information-sharing with colleagues
Information-sharing with women
Assessment of women
Assessment of fetus/baby
Training
Support
Use of equipment
Staffing Levels
Communication
Legal issues
Midwifery care
Financial concerns
Stress/burnout
Personal qualities
Management of change
Working environment
Professional role

This framework was then used to extract meaningful text segments, or individual words, from the journal articles. Care was taken to ensure that the text chosen was relevant to the aims of this study.

5.6.1.8. Identifying the Themes

Once each code was identified, the text segments relating to each code were examined to identify the salient, frequently-occurring or significant issues in order to obtain the underlying themes. The 28 codes contained in the Coding Framework were reduced to 21 groups or basic themes to ensure that they were non-repetitive but still encapsulated the ideas contained in the text segments. The left hand column in Table 5.8. illustrates the Basic Themes.

5.6.1.9. Construction of the network

The next step was to form the thematic network (Attride-Stirling, 2001). First, the Basic Themes were arranged in groups which covered similar issues or areas (Attride-Stirling, 2001) to form the Organising Themes. From the 21 Basic Themes, six Organising Themes were constructed which are illustrated in Table 5.8.

The Organising Themes were then examined and grouped to identify Global Themes (Attride-Stirling, 2001), see Table 5.8. In this literature review only one Global Theme was identified which summarised the concepts mentioned in the journal articles:

- Successful Implementation of New Midwifery Practice.

Table 5.8.: Illustrates the Basic, Organising and Global Themes obtained from the literature review.

Basic Themes	Organising Themes	Global Theme
Professional Boundaries Professional Knowledge Clinical Practice Competence	Professional Skills	Successful Implementation of New Midwifery Practice
Expectation vs Reality Preparation for Change Previous Experience of Change	Management of Implementation/ Change	
Team Working Information Sharing Support Dominance Working Environment Relationship with Service Users	Organisational Culture	
Litigation Risk Guidelines and Policies Documentation	Legal Issues	
Staffing Levels Finances	Resources	
Confidence Stress and burnout Levels Job Satisfaction Personal Life	Staff Wellbeing	

Attride-Stirling (2001) proposes that the themes obtained from the analysis should be presented by a non-hierarchical web-like structure in order to summarise the main themes and to aid understanding of the results. The Thematic Network obtained from the analysis of the literature to explore midwives' attitudes to reorganisation of services or change/implementation of new midwifery practices is illustrated by Figure 5.2. The Organising Themes are illustrated in 'yellow' with their Basic Themes clustered round them.

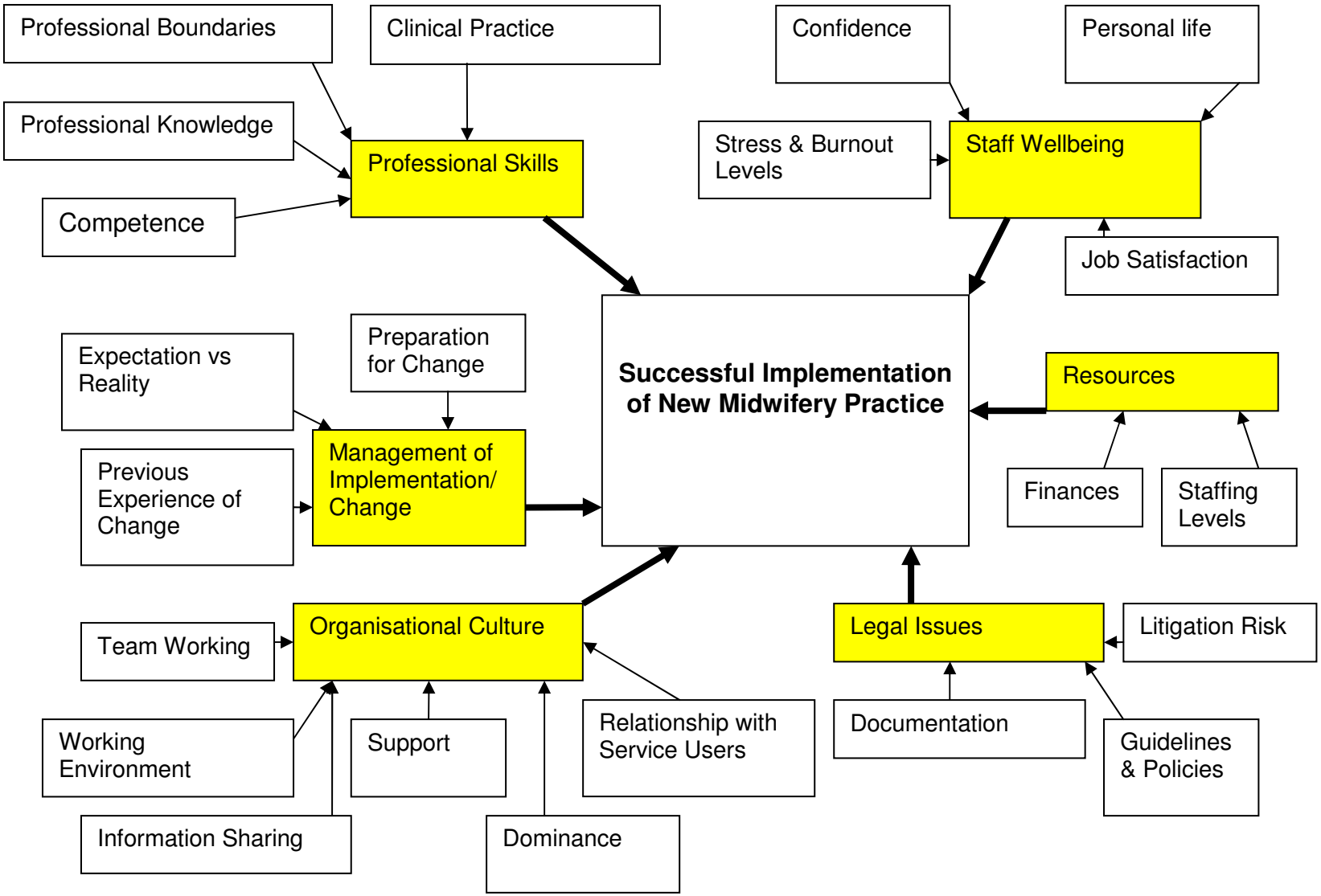


Figure 5.2: Thematic Network for Factors Which Influence Midwives' Attitudes When Implementing New Clinical Practice: obtained from literature review

5.6.1.10. Description and Exploration of the Thematic Network

The analysis of the journal articles revealed one Thematic Network comprising six Organising Themes and 22 Basic Themes which impacted on service re-organisation or the introduction of a new midwifery practice. The Organising Themes will now be explored and described in detail following Figure 5.2. starting with 'Staff Wellbeing' and working clockwise round the Network, and using text from the journal articles to illustrate the findings (Attride-Stirling, 2001).

5.6.1.10.1. Description and exploration of the Organising Theme 'Staff Wellbeing'

This theme comprises four Basic Themes. When examining the characteristics of this theme, it was felt appropriate to name it 'Staff Wellbeing' as the Basic Themes are concentrated on the effects which the changes in midwives' working practices exert on their own welfare.

Personal Life

One common theme in the literature was the impact of the changes on the 'personal life' of midwives. When Browne (1994) investigated midwives' thoughts about the Changing Childbirth (DH, 1993) recommendations, 30% were anxious about the personal commitment which would be required and 58% declared themselves happy with current working arrangements and were therefore

reluctant to change. McFarlane (1997) evaluated a pilot for a team midwifery project and found questions relating to the sustainability of the project which might be jeopardised by the disruptive effect on midwives' personal lives because of the on-call system and the requirement to work more flexible hours. Sandall et al. (2001) found that midwives who worked in caseload schemes recognised that the support of family and friends was important and acknowledged that their working lives affected their families ('*he finds it hard enough when I'm on call*'), and that partners disliked not knowing when they would return. Some midwives had to leave their caseload scheme because of personal circumstances (Stevens & McCourt, 2002a). They felt that the way of working '*intruded into their personal lives*' and mentioned in particular the '*the mobile phones*' (Stevens & McCourt, 2002b). Midwives who enjoyed caseloading stated that the flexible working hours and on-calls did bring the compensating benefits of long holidays and allowed them to recharge their batteries (Stevens & McCourt, 2002b).

Job Satisfaction

The evaluations of two caseload projects noted that '*job satisfaction*' was increased once midwives had adapted to the new role (Stevens & McCourt, 2002b; Pankhurst, 1997). The responsibility for a number of clients generated a '*sense of pride and duty*' (Pankhurst, 1997). Continuity of care also enhanced 'job satisfaction' (Sandall et al., 2001; Pankhurst, 1997). Turnbull et al., (1995) found that when midwives started working in a midwife-led unit they enjoyed the role. However, when the caseload model was implemented, there followed a period when midwives experienced negative feelings, possibly leading to

increased stress levels but this decreased over time. Hundley et al., (1995) when comparing midwives working in a midwife-led unit (MLU) and a hospital labour ward, found that the important predictor for midwifery job satisfaction was '*responsibility for all management decisions in labour*'. Midwives who had the lowest self-esteem were those working on the labour ward because medical staff were often overseeing the care of women and as a consequence there was less scope for decision-making by midwives.

Stress and Burnout Levels

One concern which midwives did report was that they were fearful about 'stress and burnout' (Sikorski et al., 1995) as they had worked with colleagues who had suffered in this way and had left midwifery as a consequence (Sandall et al., 2001). One midwife reported thinking during a birth: '*just get on with it and have the baby. I want to go home, I've had enough. I think that's why I'm taking a break. I'm getting to the point where I think I can't be bothered'* (Sandall et al., 2001). Other midwives reported that stress and burnout were reduced with increased professional autonomy and more control over their working lives: '*I could do all my visits, all the antenatal and all the postnatal at a time that suited me as well as the woman and her family '* (Sandall et al., 2001). The same midwife, however, did admit that '*the only thing you have to worry about is the births*'. For some midwives the uncertainty surrounding their workload increased stress levels: '*never knowing what you're facing…… never being able to plan anything'* (Sandall et al, 2001). However, if change is implemented carefully in a 'systematic manner' then it might be possible to increase midwives' satisfaction

with their role by the changes without increasing the risk of stress or burnout (Turnbull et al., 1995).

Confidence

The final Basic Theme concerned 'confidence'. Pankhurst (1997) found that midwives were anxious about having insufficient labour ward experience which led to a lack of confidence when joining a caseload model of care and also had a detrimental effect on recruitment to the scheme. However, Pankhurst (1997) noted that midwives gained confidence the longer they worked with the caseload model. Some midwives reported that their colleagues were not promoting normality in childbirth because their '*confidence*' was '*beaten out*' of them (Lavender & Chapple, 2004).

5.6.1.10.2. Description and exploration of the Organising Theme 'Resources'

This theme comprises two Basic Themes: Finances and Staffing Levels. When examining the characteristics of this theme it was felt appropriate to name it 'Resources' because the Basic Themes concentrate on the effects of changes on midwifery staffing levels and the cost and sustainability of the new models of care. These Themes involve supply and funding, hence the chosen name for the Organising Theme.

Staffing Levels

Another concern which midwives raised was that they felt that '*more midwives were required to improve the service*' (Browne, 1994) and that there were not adequate numbers to cover colleagues' annual leave and sickness (Stevens & McCourt, 2002b). Midwives also felt threatened by the Changing Childbirth (DH, 1993) recommendation to reduce the number of antenatal contacts with women because midwives perceived it to be a management cost cutting '*exercise to cut the numbers of staff*' (Sikorski et al., 1995).

Finances

When discussing changes midwives were anxious about the lack of finance available to ensure that the re-organisation or implementation was supported correctly (Sikorski et al., 1995). They were also concerned that projects might not be sustainable as they felt previous changes had been '*done on the cheap*' (Browne, 1994) and not continued after the pilot phase. Some midwives suggested that resource constraints prevented them from giving informed choice. For example, home births were not always offered because of lack of staff (Lavender & Chapple, 2004). Many of the midwives, who were involved in caseload or team midwifery, also felt dissatisfied with their pay (Stevens & McCourt, 2002b). Another issue midwives felt strongly about was having to take on new roles, such as the six week postnatal examination of women, when GPs were still being funded for the work (Lavender & Chapple, 2004).

5.6.1.10.3. Description and exploration of the Organising Theme 'Legal Issues'

The theme comprises three Basic Themes: Documentation, Guidelines and Policies, Litigation Risk. When examining the characteristics of this Organising Theme it was felt that the term 'Legal Issues' was appropriate as most of the Basic Themes discussed efforts to avoid the risk of litigation.

Documentation

When commenting on documentation in medical notes, midwives were resentful that this was audited in order to check their practice (Furber et al, 2006). In a study asking midwives about views on infant feeding, midwives reported being careful to write in the notes, if a baby was given a bottle, that '*it was the mother's preference*' so they were not branded as '*poor practitioners*' and also because they were '*always looking from a litigation point of view*' (Furber et al, 2006). Other midwives reported that careful documentation protected them (Meerabeau et al., 1999).

Guidelines and Policies

When asking midwives about the Changing Childbirth recommendations that midwives should be the lead professionals, Meerbeau et al, (1999) noted that the midwives' knowledge of the document was poor. It was also noted that some felt it was being '*inflicted on'* them; others thought that the recommendations would

be helpful and empowering for the midwifery profession. Midwives also voiced the opinion that hospital guidelines and polices reduced midwives' autonomy and the choices they were able to offer to women (Meerabeau, et al, 1999). Other midwives reported not following guidelines if they disagreed with them and thought that, as a consequence, the mother and/or baby would benefit. Some actually reported breaking the rules by deviating from '*how things are normally done*' (Furber et al., 2006).

Litigation Risk

Midwives reported that the fear of litigation caused problems with women's choices as they felt the need to adhere to employer guidelines which tended to limit choice (Meerabeau et al, 1999; Furber et al., 2006). Others thought that as long as their documentation was good and they had observed the hospital policy they would not be '*sued*' or '*disciplined*' (Meerabeau et al., 1999). Some midwives stated that they had become '*fearful*' about waterbirths because of media stories surrounding an adverse event involving a waterbirth (Meerabeau et al., 1999). There was evidence that some midwives tried to '*protect*' themselves by emphasising in the notes that women had chosen the care provided when often the midwife had '*encouraged*' the woman to make the choice which the midwife wanted (Furber et al., 2006).

5.6.1.10.4. Description and exploration of the Organising Theme 'Organisational Culture'

This Theme comprises six Basic Themes: Relationship with Service Users, Support, Dominance, Information Sharing, Working Environment, Team Working. When examining the characteristics of this Organising Theme the term 'Organisational Culture' was felt appropriate to reflect the maternity service as an organisation with attitudes or values which all workers share.

Relationship with service users

Midwives in projects involving increased midwifery responsibility for women and care for babies felt that the changes did enhance their relationship with the women (Sandall, et al., 2001; Stevens & McCourt, 2002a) and reported '*the woman responded well to me*' (Hundley et al., 1995). However, some did find '*personality clashes*' and '*client demands'* put a strain on the relationship (Stevens & McCourt, 2002a). Other midwives found it difficult to build a relationship with women in strong labour whom they met for the first time when they arrived at the labour ward (Hundley et al., 1995).

Support

When midwives were asked about proposed changes, some were reluctant to embrace them because they feared criticism from colleagues (Browne, 1994). There were tensions between the midwives working under the new models of

care and the hospital midwives who continued to work with the traditional models (Turnbull et al., 1995). These tensions lasted some years after implementation (Stevens & McCourt, 2002a). Other midwives reported feeling like '*piggy in the middle*' and '*being caught in the crossfire*' when they attempted to be advocates for women because colleagues did not support them (Stapleton et al., 2002). There was also the feeling that managers were not always supportive of the new working practices (Browne, 1994) and that managers were regarded as a '*lap dog for obstetricians*' (Lavender & Chapple, 2004). Midwives working in caseload or midwifery teams thought that good working relationships within the team were important and provided a 'major support' mechanism (Stevens & McCourt, 2002a). They also appreciated the creation of a support network with a '*wide range of individuals*' other than midwives (Stevens & McCourt, 2002a).

Dominance

Doctors were seen as barriers to midwifery autonomy and midwives stated that women needed to understand that they don't always require medical care (Meerabeau et al., 1999). Some felt that the '*medical model of care'* seemed to dominate the philosophy of care in the maternity unit (Lavender et al., 2004) and admitted that they '*went with the flow*' because '*it made life easier*' (Stapleton et al., 2002). Stapleton et al., (2002) found that some midwives felt that their colleagues were '*behaving like doctors'* and there were reports of '*horizontal violence*'. There is evidence that midwives find it difficult to resist '*peer pressure*' (Lavender & Chapple, 2004) and most felt they needed to limit options for women because '*it is difficult for midwives to empower their clients when they are*

themselves undermined by the cultural and organisational tensions that arise from attempting to deliver woman-centred care within a hierarchical system' (Stapleton et al., 2002).

Information Sharing

Furber & Thomson (2006) found that midwives spoke of persuading women to choose the decision which suited each midwife best, rather than the woman and her baby. Midwives were also prepared to '*break the rules'*, contravening guidelines, and to be selective with the information they provided to women (Furber & Thomson, 2006). Browne (1994) found that 74% of midwives thought that they were providing adequate information to women in order to enable them to make informed choices. However, Changing Childbirth (DH, 1993) stated that 75% of women would like midwives to provide more information which Browne (1994) suggests would seem to indicate that midwives are '*not in tune with women's needs*'. Browne (1994) found evidence that midwives were reluctant to share information with women in order to remain in control during labour. She also noted that 56% of midwives were '*stereotyping*' women into groups which might mean that some more vulnerable women might be thought less able to benefit from important information and so became even more disadvantaged.

Working Environment

A busy hospital labour ward was reported by midwives to be preventing continuity of carer for women as '*mum and dad were left for long periods of time on their*

own with several midwives coming in and out' (Hundley et al., 1995). In the same study midwives also felt that the shift change affected continuity of carer and led to dissatisfaction for midwives as they had to '*hand over care*' (Hundley et al., 1995). Midwifery sisters found it difficult to provide care for women and also take responsibility for the unit because being '*in charge of the shift*' meant that they '*could not stay in the room all the time*' (Hundley, et al., 1995). Midwives reported that they found the atmosphere and surroundings of a MLU more '*relaxing to work in*' and felt that this would '*enhance care being given'* (Hundley et al., 1995).

Team Working

Midwives reported having problems over building relationships with women and offering them choices because they experienced peer pressure from colleagues and managers who checked up on their practice and questioned why interventions such as artificial rupture of membranes (ARM) had not been done (Stapleton et al., 2002). Midwives also reported problems with liaison between colleagues (Turnbull et al., 1995). Midwives welcomed the opportunity to conduct deliveries without students; one midwife reported to Hundley et al., (1995): '*nice to have no learners present*'. The desire was expressed by some midwives that team midwifery would be considered preferable to the caseload midwifery model because of the '*unacceptable on-call rotas*' required with the caseload model (Sikorski et al., 1995). Part-time midwives were particularly concerned as they felt they might be '*left on the sidelines*' with the caseload model (Silkorski et al., 1995).

5.6.1.10.5. Description and exploration of the Organising Theme 'Management of Implementation/Change'

This theme comprises three Basic Themes: Previous Experience of Change, Expectation vs Reality, Preparation for Change. The name given to this Theme is self-explanatory. All the Basic Themes were concerned with the experience of the change implemented and the consequences of the change.

Previous Experience of Change

Midwives, especially those who had worked in the NHS for some years, were cautious about proposed Changing Childbirth (DH, 1993) recommendations because they had '*seen many changes good and bad*' (Browne, 1994). Others reported that they had been left with negative feelings about previous changes so were less open to possible future changes (McFarlane, 1997).

Expectation vs Reality

When changing midwifery working practices, midwives reported that it took several months to adjust and feel comfortable and confident in the new role (Pankhurst, 1997) and talked about the initial '*steep learning curve*' (Stevens & McCourt, 2002b). Part-timers found it difficult to integrate into the new role, and other full-time colleagues found it difficult to incorporate part-timers into the ongoing ideas and developments (Pankhurst, 1997). Midwives also experienced differing attitudes as the new project progressed, seeing benefits initially '*it's good but hard*', but when reality dawned: '*providing total care is not as easy as all that*'. Sometimes they felt things had got worse and there was '*nothing good about it*'

(McFarlane, 1997; Sandall et al., 2001). Midwives also found it difficult being in the '*spotlight*' when trying new models of care (Pankhurst, 1997). Midwives were also anxious that pilot projects would not have the resources to continue and towards the end of the project would therefore start to look for other jobs (Sandall et al., 2001). This stopped once the funding was secured to make the project long-term (Sandall et al., 2001).

Preparation for Change

When evaluating a caseload midwifery model, Pankhurst (1997) found that midwives reported problems with acquiring the training necessary to support their new role. They were also disappointed with the proposed orientation programme as it had been '*seriously compromised*' because of staff shortages. Some midwives did not even have an induction programme (Pankhurst, 1997). Midwives also suffered poor pre-planning before one project was implemented and inadequate support at the start of caseload midwifery care (Pankhurst, 1997). Some reported a clash of cultures among the midwives who were implementing the changes (McFarlane, 1997). Others were reluctant to change as they were happy with their current working conditions (Browne, 1994). However, if care was taken with the pre-planning period, and any identified problems discussed as they arose, the implementation would be more successful (Turnbull et al., 1995).

5.6.1.10.6. Description and exploration of the Organising Theme 'Professional Skills'

This theme comprises four Basic Themes: Competence, Professional Knowledge, Professional Boundaries, Clinical Practice. The characteristics of this Theme apply to the various aspects of working as a professional midwife, so the name 'Professional Skills' was appropriate.

Competence

Midwives reported being anxious about rotating between different environments and how to gain the skills required for the different areas and maintain their competence. This was a particular concern of community midwives who were required to work on the labour ward (Meerabeau, et al., 1999), especially with regard to the care of high risk women (Stevens & McCourt, 2002a). Midwives spoke of being anxious about '*Syntocinon and all that*' saying '*I haven't a clue*' (Stevens & McCourt, 2002a). Midwives also felt that there was insufficient training or help to help them gain new skills when taking on new roles (Lavender & Chapple., 2004).

Professional Knowledge

There was evidence that midwives felt their training did not reflect the reality of practice, but the theory was judged to be excellent, although it was not always possible to transfer the knowledge gained at university to the clinical area

(Lavender & Chapple, 2004). Lavender & Chapple (2004) also found that there was resentment among midwives working with low-risk women who had to return to labour ward to up-date their high risk skills, while there was not a reciprocal agreement for midwives working on labour ward to up-date their skills in a low-risk area.

Professional Boundaries

There was evidence that midwives differed in the way they defined personal and professional boundaries (Stevens & McCourt, 2002a). Some midwives found it difficult to know when to stop and felt that they '*had to do it all*', not wanting to miss births (Stevens & McCourt 2002b). When evaluating the Albany Midwifery Practice which was a midwifery caseload model of care, Sandal et al., (2001) found that hospital midwives thought that the Albany midwives '*shifted the goal posts*' by, for instance, allowing women '*having a VBAC*' (vaginal birth after caesarean section) to birth at home, when a VBAC would normally be a contra-indication for a home birth. Stevens & McCourt (2002a) also found that midwives found it difficult to determine what the role of the midwife is, and what it is not. Midwives found it difficult to decide whether a referral to an obstetrician was required. There was also evidence that women were being given unnecessary care caused by the overlapping of roles between midwives and doctors because medical staff did not always have confidence in midwives' assessments; for example, women were '*subjected to unnecessary vaginal examinations*' (Meerabeau et al., 1999). There were also doubts about extending the role of the

midwife further because '*there isn't anyone left to do hands-on midwifery*' (Lavender & Chapple, 2004).

Clinical Practice

Midwives generally felt that '*the midwife is the expert as far as normal pregnancy and childbirth go*' (Meerabeau et al., 1999; Sikorski et al., 1995). However, some midwives felt that there was the danger of poor risk assessment of women, so obstetricians should not be excluded and, if they were, it would be '*detrimental to collaborative teamwork*' (Sikorski et al., 1995). Other midwives stated that they used to blame obstetricians for the lack of normality on the labour ward but they now realised it was the '*shift leaders*' and some of the '*older midwives who trained in the times of technological advancements*' who were '*the main barriers and have forgotten that childbirth is normal*' (Lavender & Chapple (2004). Midwives working with the caseload model initially found it difficult during the quiet times when they '*haven't been busy at all'* saying that they '*felt bad, bad*' about the fact they were '*not working*' because they thought that they '*should be doing something*' (Stevens & McCourt, 2002a).

5.6.1.11. Summary of the Thematic Network

When exploring the network, six very clear themes emerged from this literature review which might impact on the success of any maternity service reorganisation.

In summary there was evidence that:

- Midwives are anxious that any changes might impact on their own personal lives and families.
- Midwives have concerns over the funding allocated to new projects and the staffing levels.
- Midwives are mindful of previous changes which may affect how they receive future plans for change.
- Midwives are careful with documentation in order to lessen the risk of litigation but may not adhere to policy documents if they disagree with them.
- The culture of a maternity unit impacts on the implementation of midwifery changes.
- Midwives' thoughts about their own professional skills and role impact on reorganisation.
- Initially midwives had doubts about their ability to adapt to the changes but grow into the new roles with experience.

5.6.1.12. Interpretation of the patterns

The analysis of the 13 papers has revealed clear areas that a large, complex organisation, such as the NHS, needs to consider when planning to make changes to midwives' practice or when planning maternity service reorganisation. The themes which emerge are multi-faceted, inter-related and often controversial.

On examination, the Network in Figure 5.2. is typical of a large, accountable, public organisation which has complex structures and issues to address before implementing change. Such an organisation has a large workforce with competing and conflicting agendas, as identified by the midwives' comments concerning relationships with medical staff, midwifery colleagues and managers. There have been Government documents (DH, 1993; DH, 1998; DH, 2004; DH, 2007) which have recommended that midwives become the lead carers for low-risk women and carry out tasks which previously would have been undertaken by medical staff. These documents have driven many of the changes which maternity services have implemented over the last two decades. The aim of the Government has been to give nurses and midwives a greater role and involvement in health service developments. However, from this review, it appears that midwives sometimes felt that the changes were forced on them, and as a consequence midwives had difficulty in adapting to the new ways of working.

With an increasing emphasis on healthcare efficiency, there are tensions emanating from balancing the skills and wellbeing of the organisation's staff with the need to provide a high standard of care to the users of the service which is also cost-effective. Even when involved with changes and embracing them, midwives were still anxious about the effects on their own wellbeing and their families. Midwives had to work even more flexible hours, on-calls and provide care to women in different settings. Some changes were perceived as being cost-cutting exercises to reduce the numbers of midwives required and expecting them to work harder. Many midwives had experience of previous NHS changes which they felt had been undertaken on minimal budgets, with inadequate staffing

levels, and disbanded after the initial set-up. They had become disillusioned and this inevitably had an effect on their attitudes to future changes. Changes which are aimed at balancing the demands of a large organisation in order to provide good quality, sustainable services with the co-operation and wellbeing of staff can cause tensions if staff are not aware of the reasons behind the implementation and do not feel involved in it.

The NHS has to ensure that it provides an equitable service to women and that users experience good outcomes. In order to achieve these aims, guidelines and policies are written for staff to follow. There was evidence that midwives felt that these documents affected their relationships with women and, in practice, restricted the choices they were able to offer to women. However, the organisation cannot control all staff behaviour and there were indications that some staff were prepared to deviate from the guidelines in order to provide women with the care they requested, or the care which midwives preferred to offer.

The NHS also needs its staff to be well-trained professionals, but training is expensive: firstly because of the actual cost of the training and, secondly, because staff have to be withdrawn from their primary duties in order to receive the training. When staff are required to undertake new roles, they do need training in order to gain the necessary skills and they then need support in order to become confident and competent practitioners. There was the perception that

training is often of poor quality or even non-existent and that management does not support the midwives once the changes have been implemented. This will almost certainly have a negative effect on the success of the changes and adversely affect how midwives embrace them.

Midwives who worked with new models of care, such as caseload or midwife-led care, did experience greater job satisfaction once they had adjusted to their new role. They enjoyed good relationships with the women. These midwives became more confident and competent as practitioners and, as a result, their morale was boosted. However, some did find that it was difficult to define the boundaries within which they should be working and the relationship with doctors was extremely important and a potential source of misunderstanding or even conflict.

The findings of this review indicate that there are several issues which affect how midwives adjust to new working practices. If these issues are not addressed at the planning stage they may well develop into a serious organisational problem which prevents the service from moving forward. However, if they are considered as part of the pre-planning and implementation process, the result will be the achievement of the Global Theme, which is that the implementation of the new midwifery practice will be successful.

5.6.1.13. Literature Review Discussion

This literature review was conducted in order to obtain information about midwives' attitudes to change so that a semi-structured interview schedule could be constructed to ask midwives about their opinions of waterbirths. The literature review revealed papers written some years ago, in response to Government documents such as Changing Childbirth (DH, 1993). Many of the recent papers were rejected because they investigated midwives' attitudes to undertaking new roles, which were previously carried out by doctors, or the use of technology or interventions in childbirth. These were rejected because midwives' attitudes might be influenced by comments already made about the controversy as to whether they should extend their practice to include such work. Many of the papers had originated from larger projects investigating new midwifery models of care and the authors published these secondary papers to reveal midwives' thoughts on the changes (Pankhurst, 1997; Sandall et al., 2001; Turnbull et al., 1995; Stapleton et al., 2002; Stevens & McCourt, 2002a & b).

The review provided the themes which were then used to construct an interview schedule to inform further the Q sort concourse. The next section of this thesis will describe the process and findings of the semi-structured interviews.

5.6.2. Semi-Structured Interviews with Midwives

Once themes were obtained from the literature, a semi-structured interview schedule was devised (Appendix 16) and five midwives were interviewed to gain additional information specifically about their views and experiences of waterbirths.

5.6.2.1. Aims of Semi-Structured Interviews

The aims of these interviews were to:

I. Obtain information about midwives' experiences of waterbirths and their attitudes towards them in order to see whether additional themes emerge.
II. Confirm themes for the Q Methodology research stage.
III. Formulate statements for the Q Sort using comments which emerge from the interviews.
IV. Ensure that the Q Sort statements have construct and content validity.

5.6.2.2. Methodology

The data collection tool chosen for this phase of the research was a semi-structured interview which has been described as an 'interview in which the interviewer asks specified questions and uses discretionary probes or asks additional questions to amplify and clarify responses' (Doordan, 1998).

Interviews have been described as 'a verbal exchange of information between two or more people for the principal purpose of one gathering information from the other(s)' (Pole and Lampard, 2002). Qualitative interviewing is a way of finding out what others feel and think about their worlds. Rubin & Rubin (1995) compared it with a 'great adventure' with every step bringing new information and opening windows into the experiences of the person being interviewed. Interviews are used to obtain information about the participants' experiences, behaviour, emotions, feelings, knowledge and opinions surrounding the topic under investigation (Parahoo, 1997). Interviews enable participants to talk in their own words about the topics they feel are significant to them.

The semi-structured interview schedule was the choice of data collection for this stage of the research because it combined the advantages of structured and unstructured interviews: it allowed the researcher to construct an interview schedule, based on the themes which emerged from the literature review, to produce 'core' questions which must be covered. The benefits of semi-structured

interviews compared with the other interview schedules are that the 'core' questions can be compared with the responses from each participant, but the participant is also able to raise additional issues spontaneously (Herbert, 1990) which they perceive as important to their experience (Corbetta, 2003). This was especially important to this study because the aim was not only to assess whether the themes obtained from the literature review were relevant to waterbirths but also to find out from midwives if there were any additional themes which emerged during the interviews. The order of the interview schedule can be amended as appropriate as the interview progresses: new issues raised by the participant can be explored further by asking additional questions. The interviewer can also explore participants' responses in order to avoid any misunderstandings and any questions can be answered straightaway if the interview is conducted correctly (Rees, 1997). Robson (1993) says that, by using semi-structured interviews, interviewers have a 'shopping list of topics and want to get responses to them', but they have the freedom to alter the wording if necessary. However, this may lead to bias because the interviewer has to decide which issues or answers to follow up (Herbert, 1990). Suggested ways of preventing bias are to tape record the interviews and use outsiders to judge the interpretations, to have two people make notes as the interview progresses and cross-check later, or to let the participant see and check the transcript of the interview (Herbert, 1990).

One alternative method of data collection considered was a questionnaire. However, this was dismissed because the study requirement was to obtain more

detailed information from midwives about their waterbirth experiences and it would not be possible to explore or probe issues as they arose. Interviews are more time-consuming for the researcher and participant but there is less chance that the participant will misunderstand the questions (Oppenheim, 1992). Questionnaires are cheaper to administer, but response rates can be low and the characteristics of the respondents may bias the results (Oppenheim, 1992). This may occur because midwives who support waterbirths may be the ones more likely to complete and return the questionnaire.

5.6.2.3. Interview Schedule

Writing good questions is an art (Gillham, 2000). There are two main types of question which can be used in a semi-structured interview, 'open' or 'closed' (Oppenheim, 1992). Closed questions are used to force the respondent to choose from a list of suggested answers (Robson, 1993). The benefits of closed questions are that they are easy to analyse and direct comparisons can be made between the participants (Hicks, 2004). However, as Hicks (2004) states, by restricting the respondents to a list of possible answers some of the richness of the data may be lost.

In open questions, or free-response questions, the respondents are left to give answers in their own words, which may not be suitable for all participants if their communication skills are limited (Rees, 1997). The advantage of open questions

is that they give freedom to respondents to give their answers unencumbered by a prepared set of replies (Oppenheim, 1992). However, there is the risk that respondents may digress from the subject of interest and talk about other unrelated topics which are important to them on that particular day. Open questions are easy to ask, but they can be difficult for participants to answer and also difficult for the researcher to analyse. One way to prevent the participant from digressing from the area under investigation is to use prompts or probes. A probe involves the interviewer asking the respondent to explain further something already mentioned, or to bring up a topic if the participant has not mentioned it (Robson, 1993). Probes should be non-directive: 'Can you say a bit more about….?' or, 'how do you feel about….?' (Oppenheim, 1992). Prompts are questions or suggestions which may help the participant to answer the original question (Robson, 1993). Prompts are part of the interview schedule and are used to obtain additional information, if necessary, by the interviewer. Interviewer bias is greatest when probes or prompts are used (Oppenheim, 1992).

In this study, in order to obtain information from midwives, a combination of closed and open questions was used for the interview schedule. The schedule (Appendix 16) started with an introduction to explain the reasons for the research and to check that the midwives were still willing to participate. The demographic data obtained from the midwives were obtained first by asking questions about their age group, how long they had worked as midwives, their employer and main area of work, and their involvement in and training for waterbirths.

The core part of the interview used open questions with prompts which were used as necessary. The schedule concluded with a general question asking midwives whether they had anything else they would like to discuss in relation to the questions discussed or the provision of a waterbirth service. This gave midwives the opportunity to raise an unanticipated issue which may not have been touched on during the interview.

5.6.2.4. Inclusion Criteria

As the aim of this study was to obtain midwives' experiences and views about waterbirths the participants were UK Registered Midwives who were practising at the time the interviews were conducted.

5.6.2.5. Preparation to Conduct the Semi-structured Interviews

The interview schedule was piloted with two retired midwifery colleagues of the researcher to check that the questions were clear. No changes were required. This also gave the researcher the opportunity to practise the questions. According to Barker (1996), the quality of the information obtained from an interview is dependent, to a great extent, on the behaviour of the interviewer. The ability of a researcher to establish a rapport with the participant and maintain a smooth flow within the interview is also important (Rees, 1997). Non-verbal

communication also has to be considered. If the interviewer is relaxed, the participant is more likely to relax and respond well to the questions (Rees, 1997).

To ensure the analysis does not become too lengthy and unmanageable, Gillham, (2000) advises that the interviewer keep the process moving. Therefore, for this study the interviews were planned to last approximately 30 - 40 minutes.

5.6.2.6. The Interview Process

Registered midwives were invited, at meetings external to the NHS, to participate in the study and those interested were given a Participant Information Sheet (Appendix 14). The researcher then contacted the midwives a few days later to see whether they would be willing to participate. Each midwife was given the opportunity to choose a venue, outside the NHS, where the recruits would feel comfortable while describing their experiences of waterbirths. The interviews were conducted face-to-face with only the researcher present. This was to enable the participants to express their thoughts and feelings more freely than would possibly be the case if other colleagues were present. The researcher, who is a Registered Midwife, acted as the interviewer.

At the start of the interview, the researcher asked whether the recruit had any questions emanating from the Information Sheet, and if so, these were discussed. Once the midwife had confirmed that she was willing to participate, she signed a

consent form (Appendix 15). The midwife kept one copy and the researcher kept a second copy.

The interview schedule was followed at the start of each interview. However, as each interview progressed, questions did not always follow the same sequence for each participant. This was because the midwife's answers could generate fresh questions in order to follow up the comments given. Nor was the schedule followed meticulously. When a midwife started discussing issues related to other questions the flow was not interrupted. The researcher omitted questions from the schedule if they had been covered by the participant when responding to an earlier question.

The interviews were not tape recorded; instead, the researcher took notes during the interview and typed them up soon after the interview was completed while still fresh in the mind (Patton, 2002). The researcher also asked participants if she could contact them at a later date if the notes were unclear, to check their responses (Patton, 2002). However, this turned out not to be necessary. Once typed, the transcript was then sent to the participant to ensure it was an accurate reflection of her recollection of the discussion. No midwives requested amendments.

5.6.2.7. The Process of Data Analysis

The aim of the semi-structured interviews was to gain an understanding of midwives' experiences of waterbirths and to relate the findings from these interviews to the themes obtained from the literature review investigating midwives' experience of reorganisation to maternity services and their views about new midwifery practices. Therefore, the thematic network analysis process, as explained earlier in this chapter, was used (Attride-Stirling, 2001) to maintain consistency and aid comparison of the themes.

5.6.2.7. The Recruitment of Midwives

Five midwives were approached opportunistically by the researcher. All the five midwives agreed to participate. Each interview lasted between 30 – 60 minutes and was held at a time and venue convenient to the participant.

5.6.2.8. Demographic data of Participating Midwives

The demographic data of the five midwives is shown in Table 5.9. All the midwives worked in maternity units which had a birthing pool. However, one

hospital had only an inflatable pool which had to be set up by midwives when needed. All the midwives had experience of conducting waterbirths. One midwife's main role was as an independent midwife, but she also worked part-time as a bank midwife in her local maternity unit.

Table 5.9.: Demographic Details of Midwives Participating in the Semi-Structured Interviews

Midwife	Age Group	Years working as a midwife	Employer	No. of women giving birth in participant's hospital	Area of Work	No. of births involved with last year.	Birthing Pool in Unit?	Total no. of Waterbirths	Training for Waterbirths
1	51-60	20	NHST *	4700	Community	25	Yes	10	2 Study Days.
2	41-50	10	Independent Midwife & Bank Midwife	20 3900	Community	15	Yes	100	Shadowing midwife. Annual updates.
3	41-50	18	NHST *	4700	Hospital	100	Yes	20	Shadowing midwife. Study Day.
4	61-70	38	Midwife-Led Birthing Unit	600	Hospital	5	Yes	30	Observation. Shadowing midwife. Study Day.
5	31-40	11	NHSFT +	6000	Hospital	20	Yes	10	Shadowing midwife.

* NHST – National Health Service Trust
+ NHSFT National Health Service Foundation Trust

5.6.2.9. Midwives' Responses to the Core Questions

Question 13: Please could you describe your experience of waterbirths?

All the midwives reported having '*positive experiences'* with waterbirths and two stated that they '*enjoyed*' doing waterbirths (Midwife 3, 4). Midwife 4 stated that waterbirths were far more relaxed than the traditional birth and that '*it is a case of sitting and talking to the woman*' and that there is '*more freedom for the woman and for the midwife*'. Midwife 3 thought that '*it is easier and less difficult for midwives caring for women in the pool*' and it was '*nice for the woman and midwife*' because the maternity unit '*provided 1:1 care when women are in the pool*'. However, only one midwife, who worked as an independent midwife, stated that she '*encouraged all mothers to try the pool*' because most of her women hope to give birth at home and that warm water is a '*safe method of pain relief compared to drugs*' (Midwife 2). Others said they could only offer the pool '*when it was available*' (Midwife 5, 3, 1) and '*if there were enough midwives on duty*' (Midwife 4).

Some midwives expressed the view that certain groups of women do not want a waterbirth and therefore, they would not suggest using the pool. This was demonstrated by Midwife 5 who said '*not many women request them*' and that '*I don't offer them much as most of the women giving birth in the unit are Asian. They don't do waterbirths*'. The independent midwife (Midwife 2) also stated that '*I'm respectful of people's views so don't force it on them*' but she also stated that

'*her client group tended to be middle class women*' who are the group which is '*more likely to take up the opportunity of a waterbirth*' and expect the midwife caring for them '*to be able to do waterbirths*'.

All the midwives were giving examples of their opinions about the positive aspects of waterbirths, so they were all asked the prompt question:

Have you had a negative experience with poor outcomes for mother and baby?

Two midwives stated that they had experienced no negative or emergency situations when using a birthing pool. However, three midwives had been involved in situations when they felt anxious. Midwife 2 was able to talk about '*a few negative experiences'* out of her 100 waterbirths: one case of cord prolapse and the woman had to be evacuated from the pool as an emergency situation, one woman fainted after the birth because she stood up too quickly, and a third scenario involved a shoulder dystocia, which is another medical emergency, so the woman was sat on the edge of the pool, out of the water, and McRoberts manoeuvre was performed. In all cases the mothers and babies were fine.

Midwife 4 spoke of occasions when she had needed to ask women to leave the pool because of concerns over the fetal heart rate or the progress of labour, which caused disappointment to the women involved. She found that '*women*

either seem to progress quickly in the pool or it can slow them down' and she stated that '*it's as if some women need to birth on land*'.

Midwife 3 spoke of a 'risky experience' when she was working with a senior midwife who was '*in charge of the delivery*'. When the baby's head was delivered the senior midwife noticed that the cord was tight round its neck. Midwife 3 described how the midwife kept '*fiddling with the neck and cord*' and then asked the woman to '*get her bottom out of the water*'. The woman did so, but then '*resubmerged the baby's head under the water*' which meant it was at risk of water inhalation. Midwife 3 described this as a '*risky and scary*' situation until the baby was born and removed out of the water and she '*realised the baby was ok*'.

Question 14: What professional skills do you think are required to undertake waterbirths?

Two of the midwives stated that '*waterbirths are the normal role of the midwife*' and that when undertaking waterbirths they were '*using all their midwifery skills*' (Midwife 1, 4). Midwife 4 claimed that '*midwives nowadays have become too technical*' and that they are '*happy to put women in a bath while in labour but not the pool*' and she asked '*what is the difference?*'

However, four midwives did think that additional training was necessary. Midwife 4, although she thought midwives did not '*require additional skills*', admitted that it was necessary for midwives to '*practise emergency evacuation of the pool*' and to ensure they '*know the guidelines*' detailing care for women in the pool.

It was generally agreed that '*all midwives should have some formal training*' (Midwives 1, 2, 3 & 5). Midwife 2 did warn that training should not be seen as '*any big deal as that will put midwives off waterbirth if it is thought to be so different*'. Two midwives (1 & 4) thought that midwifery supervisors should ask each midwife at their annual supervisory review about their waterbirth training and assess if they feel competent and confident to undertake waterbirths. Midwife 3 stated that there are '*still midwives who will not use the pool'* and that the *'biggest thing preventing them is fear*'. It was also perceived that these midwives had been '*trained in the medical way*' and that they were able to get away with not doing waterbirths by claiming they '*have a back problem*' (Midwife 3 and 1).

Another reason that some midwives did not offer women the birthing pool was that '*doctors are against waterbirths and say it is not safe practice*' and that these '*adverse comments put midwives off using the pool*' (Midwife 4). This midwife was very indignant that midwives were able to continue to '*make numerous excuses to prevent using it*' and so deny women their choice of pain relief.

Question 15: How competent do you feel to undertake waterbirths?

Four of the midwives declared that they felt very competent to undertake waterbirths because they had attended good study days (Midwife 4), undertaken several waterbirths (Midwife 1, 2, 3, 4) and supported other midwives to gain skills (Midwife 3, 4).

One midwife (Midwife 5) admitted that '*it was some time since she had cared for someone in the pool*' and that she '*could do with an update to see if there is any new evidence*'.

Question 16: What are your concerns with waterbirths?

There was a general consensus that adequate risk assessment was needed before a woman used the pool (Midwife 1, 3, 4, 5) and that the guidelines should be adhered to (Midwife 4, 5). Midwives were anxious about women having waterbirths who did not '*fit the criteria*' to use the pool (Midwife 3, 4, 5) but the participants thought that '*if every thing is progressing in a straightforward manner then there should be no problems*' (Midwife 1, 3, 4).

The other concerns which were expressed by midwives are detailed in Table 5.10.

Question 17: What are the possible health and safety issues regarding waterbirths?

Most midwives did state that they did not really '*see any health and safety issues if policies are followed*' (Midwife 4, 5) and that the majority of problems were '*no different from risks which come with any labour*' (Midwife 1, 5). However, concerns were raised regarding:

- Risk of infection for the baby (Midwife 1, 3).

- Maternal temperature while in the pool (Midwife 1).
- Back problems for midwives (Midwife 1, 2, 3, 4, 5).
- Water slips caused by wet floor (Midwife 2, 4).
- Cleanliness of equipment (Midwife 2, 3).
- Emergency evacuation of the pool difficult (Midwife 2, 3).
- Risk of a woman fainting when leaving the pool (Midwife 2).

Question 18: What do you feel are the benefits of waterbirths?

The waterbirth benefits which midwives talked about are shown in Table 5.10. Some midwives spoke of the benefits for the baby. For example, Midwife 2 said it is such a '*gentle, calm birth*' that '*one cannot tell when baby establishes breathing as it is so peaceful*'. Another said that the '*hands-off technique*' was good for baby and that she had experienced '*one baby actually crawling up on its mother's chest*' (Midwife 3). One midwife had found, working in her independent midwifery role, that women requested that their partners entered the pool as well '*although this was frowned upon in the hospital environment*' (Midwife 2).

Table 5.10.: The benefits and concerns midwives have about waterbirths. (Study ID of Participant)

Subject of Benefit/Concern	Benefit	Concern
Women:	Need less pharmacological pain relief (1,3,4,5) A better childbirth experience (1, 5) Good relaxation, encouraging endorphin production (1, 5) Women more in control of their childbirth experience (3,5) Less likely to have medical or midwifery interventions (2, 4, 5) Women more mobile in the pool, can adopt different positions (2,3,4,5) Partner can enter the pool (2) More individualised care (2) Women more satisfied with childbirth experience (3, 5)	Risks due to increased body mass index (5) Deviation from 'normal' during labour and birth (3,5) Not risk assessed correctly by another midwife (3,5) Third stage of labour carried out in the pool (1, 4) Disappointment for the woman if she has to leave the pool (2,3,4) Emergency evacuation of the pool (4)
Fetus/Baby:	Gentle, calm birth (1,2,3,4,) Born into environment just left '*from water, into water*' (1,3,4) Hands-off technique (3) Less stressful for woman means it is more beneficial for baby (5) No bright lights in face at birth (1) Not affected by pharmacological pain relief (1, 3, 4,5)	Cord around the neck (4) Infection: have to run taps for 5 mins to remove stagnant water (4) Exposure of part of baby's body to air during birth: causes initiation of breathing while under the water (2) Blueness of the baby at birth (2, 5) Getting cold at birth (2) Polycythaemia: midwife was involved with a baby who developed severe polycythaemia (2)
Midwives:	Supporting women to give birth by themselves (1, 3) More autonomous way of working (1,3,5) More natural way of working (1, 3, 4) Supports midwifery and not obstetric practice (3, 5) Happier midwives (2, 3, 5) Less stress and sickness for midwives (5) Fewer complaints from women (2) Better relationship with women (4) Less documentation (4) More relaxing environment (4) Additional 'tool in my kit box' to help support women through childbirth (2)	Stress because of anxiety, if left alone, when uncertain about care of women who were having a waterbirth (1) Gaining competency in waterbirths: there are not enough midwives to support uncertain midwives (1) How to risk assess correctly (5) Taking over care from a midwife who hasn't risk assessed correctly (Midwife 3, 5)

Table 5.10.: Continued

Subject of Benefit/Concern	Benefit	Concern
Maternity Service:	Less likely to get complaints from women (3, 4) Midwives supporting women to have natural birth are happier (2, 4) Financial savings: waterbirths cheaper than epidurals & drugs (1,2,3,5) Women more satisfied with care (3, 5) Less intervention: waterbirths cheaper than instrumental and LSCS Deliveries (1) Provision of more choice for women: so providing better service (5)	Women who do not fit the criteria but request to use the pool: a plan should be drawn-up detailing her care in the pool (4) Provision of training for midwives not competent (1, 3) Midwives who undertake tasks which they are not trained (1) Midwives who are not competent and may become stressed – leading to increased sickness (3) Ensuring midwives follow the guidelines & policies (4, 5)

Question 19: What are the resource implications when offering a waterbirth service?

Midwives stated that staffing was an issue as '*sometimes there is a shortage of staff*' (Midwife 1, 4) or the labour ward was '*too busy*' (Midwife 2, 3, 4). When caring for women on labour ward having a traditional birth '*a midwife can care for several women in adjacent rooms, at the same time*' (Midwife 1). However, unit policies seem to dictate that midwives have to provide 1:1 care at all times to women in a birthing pool and, in addition, at the birth there need to be two midwives, which causes a strain on staffing levels (Midwife 1, 3). However, two midwives disagreed with the need for two midwives at the birth, saying that staffing needed to be no different from a traditional birth (Midwife 4, 5).

There were comments that other midwives were not competent to use the pool and there was criticism of managers who do not encourage or support these midwives to obtain the necessary skills (Midwife 1). Midwife 5 felt that managers needed to ensure that all midwives are trained to provide an equitable service to women. Time for training was also an issue, although '*there are always training sessions provided for other medical type equipment and procedures*' (Midwife 1).

One midwife's unit only provided an inflatable birthing pool but she felt that there was not enough demand to warrant the cost of installing a fixed pool (Midwife 5). The liners for an inflatable pool were expensive to replace each time, but had the bonus of reducing the need to spend time meticulously cleaning the pool.

Two midwives thought that their maternity unit should have more than one birthing pool (Midwife 3, 4) because often a woman was disappointed and could not use the pool as '*another woman was in it*' (Midwife 3). However, one midwife who was involved with setting up a midwife-led unit found that it was not possible to have the number of birthing pools requested because they are much more expensive than a large normal bath (Midwife 3). The safety equipment was also expensive, such as a hoist to remove a woman from a birthing pool in an emergency (Midwife 3, 4).

Question 20: What are the legal implications which need to be considered when offering a waterbirth service?

Midwives stated that there needed to be good guidelines in place (Midwife 1, 3, 4, 5). Women also need to be provided with plenty of information about waterbirths (Midwife 2, 4) so that they understand the risks and benefits (Midwife 2). There was also a consensus that midwives needed to maintain good communication networks with women so that they understood that '*nothing can be promised*' and it's '*not possible to guarantee that everything will go to plan*' (Midwife 2, 4) in order to try and avoid disappointment.

There was also the opinion that litigation comes from '*poor set up*' (Midwife 3) and that if the correct systems and processes are in place, and women are '*risk assessed correctly*', then there is '*less risk of litigation*' (Midwife 1, 3, 5). Midwives also need to know the guidelines and work to them (Midwife 1).

Midwife 2 also stated that every woman should be able to use the pool, even if she has increased obstetric risks; as long as she understands the risks and midwifery concerns then she can '*make up her own mind about using it*'.

Question 21: How does the culture of a unit impact on the provision of a waterbirth service?

Generally midwives acknowledged that the culture of a maternity unit '*can stop waterbirths occurring*' (Midwife 1, 2, 5). Midwifery managers were seen as pivotal in a successful waterbirth service (Midwife 1). There were complaints that managers were not addressing competence issues with midwives who did not offer women the birthing pool and a feeling that managers '*turned a blind eye*' (Midwife 1).

The medical staff were also acknowledged to have an influence on the number of waterbirths carried out in a maternity unit. Generally midwives felt that doctors were '*not supportive'* and that they '*impacted on the culture of a unit*' by '*not empowering midwives*' and this '*reinforced the decision*' of some midwives '*not to offer waterbirths*' (Midwife 1). Midwives blamed their managers and leaders for not overcoming these issues by not promoting '*normal births*' (Midwife 1, 5).

The environment of the hospital labour rooms was also thought to be detrimental to achieving waterbirths by '*being too small to erect the pool*' (Midwife 5) and being '*too medicalised*' (Midwife 1, 5).

Midwife 5 stated that, in order to promote the waterbirth service, a maternity unit needs to have autonomous midwifery practitioners who are able to practise midwifery and use their '*normality*' skills. At the same time medical staff should recognise midwives' skills and '*keep away from women having natural births*'. There was also the viewpoint that midwives needed to encourage women to use the birthing pool more by asking community midwives to promote the service, and that the unit '*should regard water as the first method to cope with contractions*' (Midwife 2). Midwives who are resistant to waterbirths should be '*made*' to use the pool and midwives would then learn through experience (Midwife 2). By witnessing waterbirths, midwives will become competent and '*this means that it ripples through the unit*' (Midwife 2).

Question 22: What factors are important to consider when introducing a new practice such as waterbirths, to ensure successful implementation?

Midwives thought that having an enthusiastic leader to implement the new practice was important (Midwife 1, 3, 5) and that good communications networks should be set up from the beginning (Midwife 1, 3, 4, 5). It was also acknowledged that it would be important to involve users of the service at the outset, firstly, to ensure that the service was required by them and secondly, to ask them to help set it up and promote it to create a demand (Midwife 3, 5).

All the midwives stressed the importance of training before a new practice is implemented in order to ensure that midwives are competent and confident. One

midwife (Midwife 1) explained how she obtained waterbirth training by taking annual leave and working at another unit. That way she was able to '*observe*' midwives and work with '*the confident and competent midwives*' to '*explore*' her feelings about waterbirths and gain her skills. As one midwife stated '*it is difficult to work out of one's comfort zone*' and if one is unsure '*one is fearful*' (*Midwife 1*). Midwife 1 also stated that when new practices are implemented she is anxious so she has always made sure she is involved '*to understand what is going on and why*'. A mentoring system was also thought to be important so that midwives can be supported during and after the changes (Midwife 1, 4).

Midwives also stated that evidence-based guidelines and procedural documents should be written and explained fully to staff before changes are made (Midwife 1, 2, 4, 5).

Special emphasis was also placed on making sure that the changes were financed adequately to ensure sustainability (Midwife 3, 5) and that any necessary equipment was obtained (Midwife 4). Midwives stated that previous changes had not been successful and that it would be important to counter midwives' disillusionment with these earlier changes which had either not been fully implemented or had been stopped soon after the start (Midwife 1, 3).

Question 23: The Royal College of Midwives has stated that all midwives should be able to support a woman in the birthing pool. What are your thoughts about this statement?

All midwives agreed with the statement by the Royal College of Midwives that midwives should be able to support a woman in the pool, but there was disappointment expressed that '*in practice it does not happen*' (Midwife 3, 4). There was disbelief and bewilderment on the part of the midwives when reporting that colleagues were '*happy*' to put women in normal baths but would nevertheless '*not use the birthing pool*' even though it is '*better because the water covers the abdomen and provides good pain relief and relaxation*' (Midwife 1, 3). As a possible justification, one midwife did state that midwives '*with bad backs may not be able to*' support women in the pool (Midwife 2).

The participants felt that waterbirths are a '*normal part of midwifery*' (Midwife 1, 4, 5) and student midwives should cover '*waterbirths during their training to prevent them becoming fearful*' (Midwife 5). Some midwives expressed their enjoyment of supporting women in a birthing pool because it '*encourages me to work as a midwife*' (Midwife 4), it '*supports midwifery practice*' (Midwife 1, 5) and '*what is good for mother and baby is good for midwives*' (Midwife 5). They also spoke about extending their knowledge about the physiology of fetal temperature control and newborn respiration (Midwife 4, 5).

Question 24: Would you recommend waterbirths to women as the first option. Please explain your reasons?

All midwives stated that they advised women about the benefits of using a birthing pool and suggested that they '*try*' it. The birthing pool should be '*offered automatically to all low-risk women*' (Midwife 3, 4) but it is '*difficult on the labour ward*' (Midwife 3). There was general agreement that '*if the woman was happy to try it*', the participating midwives would support her (Midwife 1, 2, 4). One midwife claimed that it is better to use TENS first and, then once labour is established, she would suggest the pool (Midwife 5).

The reasons that midwives recommended waterbirths were:

- Good pain relief (Midwife 2, 3).
- Mobility in the pool (Midwife 2).
- Women would enjoy their '*own space*' while in pool (Midwife 2).
- '*Helps her labour progress*' (Midwife 2).
- Better than pharmacological pain relief for baby (Midwife 3, 5).
- '*Helps women cope with labour*' (Midwife 4).
- Helps women '*achieve a normal birth*' (Midwife 4).
- As a midwife '*I am a fan of waterbirths*' (Midwife 1).

Question 25: Is there anything else you would like to discuss regarding:

- ***The provision of a waterbirth service***
- ***Any of the aspects we have talked about today***

This question gave midwives the opportunity to raise any issues which had not been discussed, or alternatively, midwives could return to a topic which had been discussed in order to reinforce, or elaborate on, their comments.

One midwife was unable to think of any other comments she would like to make (Midwife 5). Four midwives spoke about their disappointment that the waterbirth service was not well utilised even though the service had been available to women for several years. Two midwives reinforced the view that strong leadership was needed, 'a *champion who believes in it*' (Midwife 1) and '*encourages midwives*' to promote waterbirths (Midwife 4). It was said again that doctors were seen to have a negative effect on the provision of waterbirths because they were '*questioning midwives about what the women were doing in labour*' when using the birthing pool (Midwife 3), and also that the situation would improve if doctors did '*not get involved with women having a straightforward birth*' (Midwife 4).

Two midwives stated that they were '*keen to promote waterbirths*' in their practice because they perceived that there are '*few concerns and the benefits outweigh the risks*' (Midwife 2, 3). However, it was claimed that other colleagues were still '*very hostile towards waterbirths because they are reluctant to embrace change*'

(Midwife 4), and they did not want to change their current practice because they were '*happy in their comfort zone*' (Midwife 1). One midwife illustrated her frustration by reiterating comments about colleagues who used a normal bath rather than a pool and how this led to a woman giving birth in a bath which was '*far more risky for the baby*' because the insufficient depth of water '*may expose part of its body to air during the birth*' which would therefore '*stimulate it to breathe while still under the water*' (Midwife 1). One midwife summed up her thoughts saying '*it is sad that waterbirths are generally not available to women even now, several years after most units have had pools*' and that '*some midwives are still fearful and don't believe waterbirths are safe*' (Midwife 4).

5.6.2.10. Coding the Interview Transcripts

A coding framework of 46 items was created, based on topics which occurred regularly in the interview. This Coding Framework contained many of the codes which had been used in the Coding Framework for the analysis of the literature review. However, there were some additional items: for example, Midwifery Supervision, Relationship with Midwifery Managers.

This framework (Table 5.11.) was then used to extract meaningful text segments, or individual words, from the responses to the core questions and prompts in the interview transcripts. Care was taken to ensure that the text chosen was relevant to the aims of this study.

Table 5.11.: Coding Framework for the Semi-Structured Interviews

Confidence	Birthing Pool
Competence	Normal Bath
Knowledge	Emergency Evacuation
Choice	Normal Birth
Benefits for Women	Leadership
Benefits for Fetus/Baby	Professional Role
Risks for Mother	Midwifery Supervision
Risks for Baby	Pain Relief
Risks for Midwives	Management of Change
Relationship with Midwifery Colleagues	Stereotyping
Relationship with Women	Midwifery Care
Relationship with Midwifery Managers	Financial Costs
Medical Dominance	Sustainability
Policies and Guidelines	Litigation
Evidence-based Care	Communication
Stress	Staffing Levels
Burnout	Equipment Cost
Power	Support of Women
Autonomy	Support of Midwives
Comfort Zone	Assessment of Women
Motivation	Waterbirth Training
Information-sharing with Women	Birthing Pool Availability
Environment	Training

5.6.2.11. Identifying the themes

Once each code had been identified, the text segments relating to each code were examined to identify the salient, frequently-occurring or significant issues in order to obtain the underlying themes. The 46 items contained in the Coding Framework were reduced to 35 basic themes in order to eliminate repetition but still to encapsulate the ideas contained in the text segments. The left hand column in Table 5.12. illustrates the Basic Themes.

Table 5.12.: Illustrates the Basic, Organising and Global Themes obtained from the Semi-Structured Midwives' Interviews.

Basic Themes	Organising Themes	Global Theme
User Involvement Support Midwifery Management Midwifery Leadership Preparation for Change Previous Experience of Change	Management of Change	The Successful Implementation of a Sustainable Waterbirth Service
Safety Confidence Job Satisfaction Stress	Well-being	
Training Clinical Practice Autonomy Professional Role Competence Knowledge Base Comfort Zone	Professional Skills	
Surveillance Information Choice Stereotyping Individualised Care Environment Alternative Care Dominance Medicalisation Evidence-based Care Motivation	Organisational Culture	
Equipment Staffing Finances	Resources	
Policies and Guidelines Emergency Events Litigation Fear Risk Assessment	Legal Issues	

5.6.2.12. Construction of the network

The next step was to form the Thematic Network (Attride-Stirling, 2001). First, the Basic Themes were arranged in groups which covered similar issues or areas to form the Organising Themes. From the 35 Basic Themes, six Organising Themes were constructed which are illustrated in Table 5.12.

The Organising Themes were then examined and grouped to form the Global Theme, see Table 5.12. In this analysis of the midwives' interviews only one Global Theme was created which summarised the concepts mentioned in the interviews:

- 'The Successful Implementation of a Sustainable Waterbirth Service'.

The themes obtained from the analysis of the interviews are illustrated by a non-hierarchical web-like structure in order to summarise the main themes and to aid understanding of the results (Figure 5.3.). The Organising Themes are illustrated in 'yellow' with their Basic Themes clustered round them.

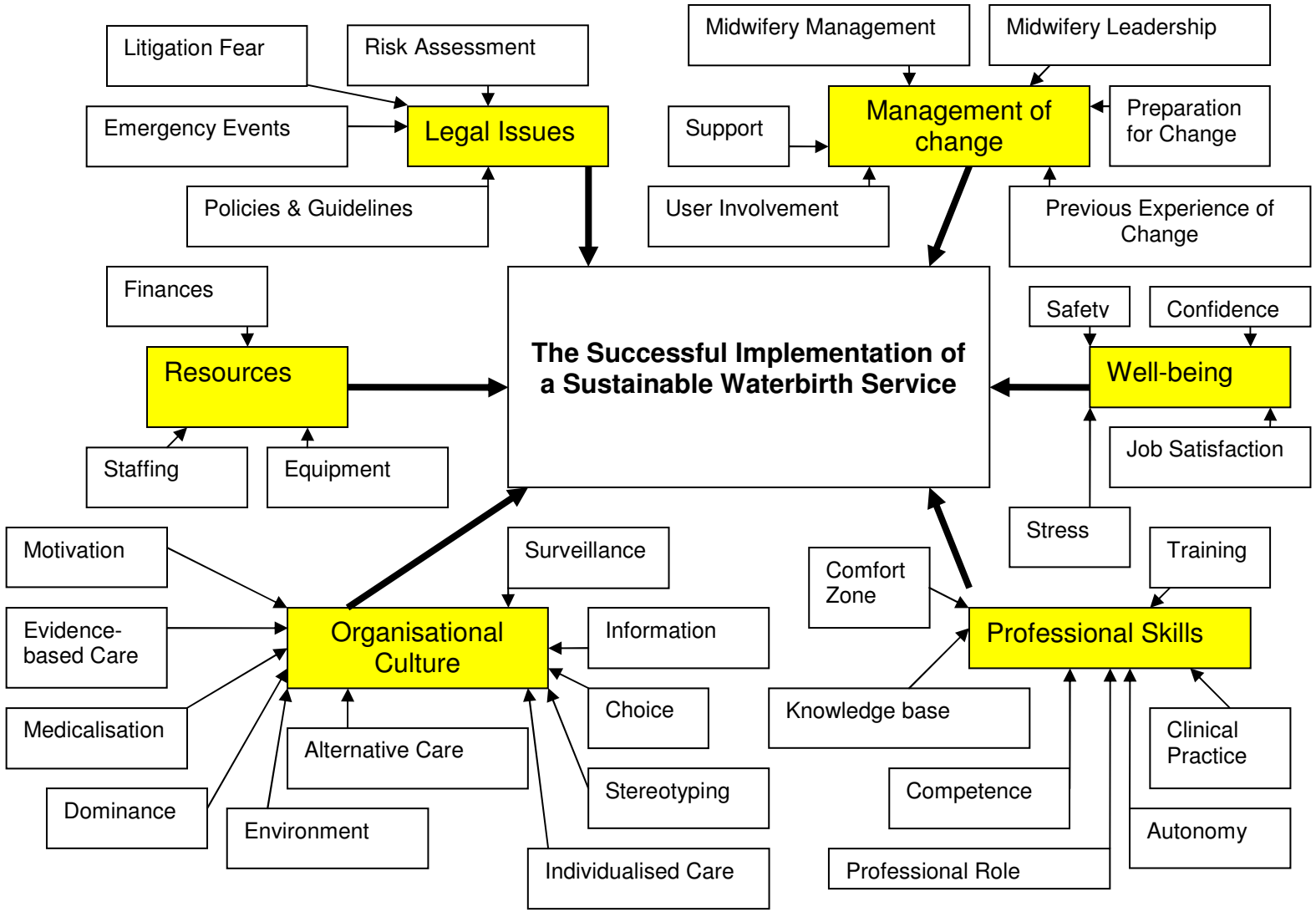


Figure 5.3: Thematic Network of Factors which Influence Midwives' Attitudes towards a Waterbirth Service: obtained from semi-structured interviews with midwives

5.6.2.13. Description and Exploration of the Thematic Network

The analysis of the interviews revealed one Thematic Network comprising six Organising Themes and 35 Basic Themes which impacted on the successful implementation of a sustainable waterbirth service. The Organising Themes will now be explored and described in detail following Figure 5.3. starting with 'Management of Change' and working clockwise round the Network. Text from the midwives' interviews will be used to illustrate the findings (Attride-Stirling, 2001).

5.6.2.13.1. Description and Exploration of the Organising Theme 'Management of Change'

This Theme comprises six Basic Themes: User Involvement, Support, Midwifery Management, Midwifery Leadership, Preparation for Change, Previous Experience of Change. All the Basic Themes are concerned with the experience of the change implementation and the consequences of the change.

User Involvement

The Government encourages maternity services to involve users of the service in any changes which are made (DH, 2004; DH, 2005). Midwives who participated in the interviews also acknowledged that women should be consulted about

changes in order to determine that there '*is a demand for the service*' (Midwife 5). If women did agree with the changes, they should be involved with promoting the service to increase the demand for it from other users (Midwife 3,5). In that way the service has a greater chance of being sustained and successful.

Support

There was general agreement from all the midwives regarding the RCOG & RCM (2006) statement that all midwives should be able to support a woman in a birthing pool. Two midwives did say that '*in practice it does not happen*' (Midwife 3, 4). However, it was acknowledged that midwives themselves should have a mentoring system in place to help and support them in gaining the confidence to master new practices (Midwife 1, 4). The midwives who were interviewed spoke about enjoying mentoring and supporting other midwives to gain their skills (Midwife 3, 4).

Midwifery Management

There were concerns that managers did not do enough to support midwives to gain the new skills required when new practices were implemented. Midwives thought that managers should address competency issues with midwives who do not offer the pool to women to '*make them use the pool*' (Midwife 1, 5). These issues were felt to be important in order to ensure that the maternity service is offering all women the same opportunities, and therefore an equitable service. It was also claimed that managers did not promote '*normal births*' which was detrimental to midwives' status in the unit (Midwife 1, 5).

Midwifery Leadership

The midwives stated that the way to increase the number of waterbirths was to find a '*champion*' who would be '*enthusiastic*' about the new service and lead and '*encourage midwives*', who were also reluctant to use the pool (Midwife 1, 3, 4,5).

Preparation for Change

As well as asking women to become involved with the implementation, it was stated that all midwives needed to be involved from an early stage (Midwife 1, 3, 4, 5). Good communication networks would be required to keep midwives updated on the progress of the implementation and to allay any fears they may have. One midwife claimed that by getting involved with changes she was less '*fearful*' and it helped her '*to understand what is going on and why*' (Midwife 1).

Previous Experience of Change

Midwives expressed disappointment that, in their experience, previous changes sometimes failed to be implemented correctly, or were not sustainable because of poor planning. It was thought that there would be a need for managers to consider this when attempting to promote a new service. It would be important to discuss with midwives their level of '*disillusionment*' concerning previous attempts to make changes and try to '*address their doubts*' (Midwife 1, 3).

5.6.2.13.2. Description and Exploration of the Organising Theme 'Well-being'

This Theme comprises four Basic Themes: Safety, Confidence, Job Satisfaction and Stress. The name given to this Theme was 'Well-being' because all the Basic Themes are related to, or have an impact on, someone's mental and physical health. The Basic Themes consider the midwife, the woman and her baby.

Safety

There were many comments about the effects that waterbirths have on midwives and users of the service. The midwives percieved that waterbirths have good outcomes for women and their babies. They claimed that warm water provides '*good pain relief*' (Midwife 1, 3, 4, 5) for childbirth and that it is also '*a safe method*' (Midwife 5) for the baby compared with pharmacological pain relief. Midwives also thought that water helps the woman to relax and enables her to move about easily, which will enhance her ability to achieve a '*physiological birth*' (Midwife 2) and reduces the '*risk of medical intervention*' (Midwife 2, 4, 5). Midwives also spoke of the benefits for the baby, such as a gentle and calm birth with '*no bright lights shining into its face*' (Midwife 1) at the birth. Midwives mentioned the measures taken to prevent the mother's temperature from rising too high while in the warm water and how to limit the risk of infection for mother and baby (Midwife 1, 3).

Midwives also discussed some concerns which they have about waterbirths. They were anxious about identifying deviations from the 'norm' while women are using the pool (Midwife 3, 5). They were also concerned about having to evacuate a woman in an emergency situation (Midwife 4). Anxieties concerning the baby were the risk of infection (Midwife 4), the baby breathing while under water (Midwife 2) and '*getting cold at birth*' (Midwife 2). One midwife had experience of a baby being admitted to hospital a few days after the birth with a '*severe case of polycythaemia*' (Midwife 2). She stated that, as a consequence, she is anxious about conducting the third stage of labour in the pool.

Midwives also spoke of physical health concerns which could affect them. One midwife thought that colleagues with a '*bad back*' (Midwife 2) may not be able to conduct waterbirths. It was also acknowledged that care had to be taken to avoid water spillages and someone slipping on wet patches (Midwife 2, 4).

Confidence

Midwives stated that it was important to have training in order to improve their own confidence in waterbirths (Midwife 1, 2, 3, 5). It was thought that if a midwife was '*uncertain about the care she was providing*' it would result in her becoming stressed because of her '*anxiety*' (Midwife 1, 3).

Job Satisfaction

Midwives reported that they '*enjoyed*' (Midwife 3, 4) supporting women having waterbirths because they are '*more relaxed than a traditional birth*' (Midwife 4) and provide greater '*freedom for the woman and the midwife*' (Midwife 4). One midwife stated that supporting women in the birthing pool '*encourages*' her to '*work as a midwife*' (Midwife 5). One drawback for midwives was that they were anxious if they had to ask a woman to leave the pool in case she was '*disappointed*' because she could not fulfil her wishes (Midwife 4).

Stress

There was a fear that midwives who were not competent, or who felt anxious about waterbirths, may become stressed if they were not supported to gain the necessary skills (Midwife 1). As a consequence, the level of midwifery 'sickness' would increase (Midwife 3). The role of management and peer support was important in combating this.

5.6.2.13.3. Description and exploration of the Organising Theme 'Professional Skills'

This Theme comprises seven Basic Themes: Training, Clinical Practice, Autonomy, Professional Role, Competence, Knowledge Base, Comfort Zone. The name given to this Theme was 'Professional Skills' because all the Basic Themes concern the specific skills midwives require in order to fulfil their role.

Training

Training was mentioned by each midwife several times, so demonstrating the importance midwives placed on it. Only one midwife thought that specific waterbirth training was not required by midwives, but even this midwife agreed that there should be emergency drills to practise getting women out of the pool with a hoist (Midwife 4). There was agreement among the other participants that midwives required training so that they would be confident and competent enough to offer women the pool. As a result, the maternity unit would provide an equitable service to all women.

It was thought that waterbirth training had a low priority compared with training for the use of medical equipment (Midwife 1). However, there was a request that waterbirth training should not be seen as a '*big deal*' because that would '*put midwives off waterbirths*' if they were seen to be very '*different*' compared with a traditional birth (Midwife 2). It was also acknowledged that to provide training sessions did have two main funding implications for a maternity unit. Firstly, the cost of organising and setting up the training sessions (Midwife 2, 5). Secondly, the cost of covering for midwives who needed to be released from their duties (Midwife 2, 5). To overcome these problems, the midwives suggested that student midwives should '*learn about waterbirths*' during their training and this might also have the benefit of preventing them from becoming '*fearful of waterbirths*' (Midwife 5).

One midwife spoke about how she obtained her waterbirth training (Midwife 4). She was anxious when women asked to use the pool so decided to arrange her own training. She contacted a maternity unit which carried out a large number of waterbirths and asked if she could work with midwives who were conducting waterbirths. She had to arrange an honorary contract and took annual leave for a week so that she could have her training. She enjoyed the week's experience of supporting women having waterbirths so much that she returned to her own unit and set up study days to train midwives and willingly supported them to obtain the skills. She did not initially tell any colleagues what she was planning because she was '*fearful in case she found she hated waterbirths*' and that when she returned to her own unit she would be expected to '*do all the waterbirths*'. However, she said she had '*never looked back*' and that '*it was well worth taking annual leave*' as she loved supporting women '*if they wanted a waterbirth*'.

Clinical Practice

There was agreement that waterbirths '*support midwifery practice*' (Midwife 3, 5) by encouraging women to achieve a normal childbirth event. Midwives were careful in their practice to prevent any adverse events from happening while using the pool by, for example, running the taps with the plug removed to flush out stagnant water from the pipes before filling the pool, in order to prevent infection to mother and/or baby.

Midwives also reported that they had '*positive experiences*' with waterbirths. Those who had experienced '*negative*' (Midwife 2), '*risky*' (Midwife 3, 4) or '*scary*' (Midwife 3) situations were philosophical and stated that it can happen at any birth (Midwife 2, 3, 4).

Autonomy

One midwife stated that, in order for a waterbirth service to be successful, a maternity unit needs to have '*autonomous*', confident practitioners who are able to practise '*true*' midwifery (Midwife 5).

Professional Role

The midwives all felt that their role was to care for '*low-risk women*' who were having '*normal physiological births*'. All agreed that midwives should be trained and able to support women in a birthing pool but there was a general consensus that '*in practice it does not happen*' (Midwife 3, 4). There were suggestions that some midwifery colleagues have embraced medical technology and have forgotten how to use their 'normal' midwifery skills and have become '*too technical to work as a midwife*' (Midwife 4). The midwives interviewed were wanting to use their '*normality*' skills (Midwife 1) and wished that medical staff would recognise and respect midwives' skills and their role in maternity services.

Competence

The midwives interviewed, spoke of feeling competent because they had attended good waterbirth study days (Midwife 1, 2, 3, 4) and were able to support other midwives to gain the necessary skills. It was thought important that all midwives should become competent to support women in the pool. However, it was acknowledged that this may be difficult because there is an '*inadequate number of midwives*' (Midwife 1) able to support those needing to gain these skills.

Knowledge Base

Midwives felt that they had improved their understanding of fetal and newborn physiology as a result of the waterbirth training sessions they had attended.

Comfort Zone

It was acknowledged that it is easy to become '*fearful*' (Midwife 3) about undertaking new tasks and having to work out of '*one's comfort zone*' (Midwife 1) and that midwives need to understand why new practices are being implemented.

5.6.2.13.4. Description and exploration of the Organising Theme 'Organisational Culture'

This Theme comprises eleven Basic Themes: Surveillance, Information, Choice, Stereotyping, Individualised Care, Environment, Dominance, Medicalisation,

Alternative Care, Evidence-based Care, Motivation. The name given to this Theme was 'Organisational Culture' because all the Basic Themes concern the characteristics of the maternity services.

Surveillance

Midwives suggested that Supervisors of Midwives should check with midwives at their annual supervisory meeting whether they are offering and using the pool. If they are not, managers should intervene and '*make midwives use the pool*' (Midwife 2), and at the same time provide support from colleagues. The hope was that, by witnessing waterbirths, the midwives would gain confidence and that their confidence would '*ripple through the unit*' (Midwife 2).

Information

Midwives stated that there needs to be good information available about waterbirths to give to women so that they can understand the benefits and the concerns. It was also thought that if women have good information they will help to promote the service and so increase the number of women requesting to have a waterbirth. They also stressed the need for women to understand that where childbirth is concerned '*nothing can be promised*' (Midwife 2, 4). If there is good communication between women and midwives, it was thought that there would be fewer disappointed women.

Choice

It was recognised that a woman needed to have enough information about waterbirths so that she could decide herself whether to use the birthing pool. The midwives stated that as long as the '*woman was happy*' (Midwife 4) to use the pool they would try and support her. The view was expressed that even a woman with obstetric problems should be allowed to use the pool if she understands the risks: she can then '*make up her own mind*' (Midwife 2) whether to take up the offer, or not.

The option of waterbirths would also enable midwives to offer women more choice for pain relief in labour, but this aim was being impeded by midwives who '*make numerous excuses*' to prevent them from offering the pool to women (Midwife 4).

Stereotyping

Midwives spoke about women who they thought may, or may not, want to use the pool. One midwife worked in a unit where the users were predominantly Asian. The hospital did not have a plumbed-in pool because there was '*no call from the women*' (Midwife 5) to use the pool. The midwife concluded that she did '*not offer the pool much*' (Midwife 5) because she deemed that waterbirths were not the choice of pain relief for this group of women. Another midwife said that she worked with '*mainly middle class women*' (Midwife 2) and that she needed her waterbirth skills because this group of women '*expected*' her to '*do waterbirths*'.

Individualised Care

Midwives enjoyed giving 1:1 care to women when they used the birthing pool. However, this did have the drawback of limiting the use of the pool when there were too few midwives on the labour ward to provide this level of staffing. When they could support women in the pool, midwives spoke of being able to '*sit and talk to the woman*' (Midwife 4) and '*having a laugh*' (Midwife 3) with women and their partners. They enjoyed the opportunity '*to get to know them better*' (Midwife 4).

Alternative Care

Midwives did not view waterbirths as '*alternative care*' (Midwife 4) but as just a part of the service they provided within their normal role as a midwife. One midwife expressed the opinion that it was an '*additional tool*' in her '*kit box*' to help women cope with childbirth (Midwife 2).

Environment

The provision of a waterbirth service on a '*busy*' labour ward was seen as problematic because midwives often had to care for several labouring women at the same time. This was not possible for waterbirths because of the requirements of hospital policies which demanded 1:1 care for a woman in the pool. Hence the waterbirth service was often denied to women. One midwife, who worked in a unit which only had an inflatable birthing pool, said that many of the rooms were not large enough to house the pool once it was inflated. The

opportunity for a woman to have a waterbirth therefore depended on which room she happened to be using at the time.

One midwife, who worked as an independent midwife, thought one benefit of the birthing pool was that partners could enter the pool with the women (Midwife 2). She had found, however, when working in hospitals that this was '*frowned upon*' (Midwife 2) in the labour ward environment. However, when she suggested it as an independent midwife working in women's homes, they and their partners often took up the offer.

Dominance

There was evidence of the dominance of doctors over midwives' practice. Midwives said that doctors did not support waterbirths and discouraged women and midwives by saying '*it is not safe practice*' (Midwife 4). There was also annoyance expressed with the way doctors questioned midwives about '*what the women were doing*' (Midwife 3) while they were using the pool. These were women to whom the midwives were providing midwife-led care so that the doctors should '*not get involved*' (Midwife 4).

Medicalisation

Midwives thought that the reason the number of waterbirths was not increasing was that colleagues who had become '*too medical*' (Midwife 3) and had been '*trained in the medical way*' (Midwife 1, 3) did not support waterbirths. They also

thought that many midwives are '*anxious when working without technology*' (Midwife 1).

Evidence-based Care

Midwives were keen to have guidelines produced for waterbirths in order to support their practice and wanted them to be based on good research evidence. Midwives emphasised that these guidelines would need to be explained to midwives as part of the implementation process. One midwife who had not been involved with a waterbirth for some time stated that she would like to attend another training day to see if there is any '*more evidence*' (Midwife 5) about waterbirths which has been produced since her last training.

Motivation

Midwives were motivated to offer a waterbirth to women because they viewed the use of warm water as beneficial for the mother and her baby. They thought that a woman was able to achieve '*good pain relief*' (Midwife 1, 3, 4, 5), good '*mobility in the pool*' (Midwife 2, 3, 4, 5), she would feel secure '*in her own space*' (Midwife 2) and that a waterbirth generally '*helps her to cope with labour*' (Midwife 2).

5.6.2.13.5. Description and exploration of the Organising Theme 'Resources'

This Theme comprises three Basic Themes: Equipment, Staffing, Finances. The name given to this Theme was 'Resources' because the Basic Themes are

concerned with the economic and support aids which are required in order to provide a waterbirth service.

Equipment

The birthing pool was seen as more expensive to purchase than a traditional large bath. Waterbirths also required additional expensive equipment to be available in case of emergencies, such as a hoist for emergency evacuation of the pool, or a resuscitaire actually in the room at the birth in case the baby had respiratory problems. However, two of the midwives stated that if maternity units were serious about providing a waterbirth service, then they needed '*to have two pools*' (Midwife 3, 4). This was to prevent women from being denied their choice of pain relief because '*another woman was in it*' (Midwife 3).

Staffing

If labour ward is '*busy*' (Midwife 2, 3, 4), midwives confirmed that the waterbirth service becomes unavailable to women because of the requirement to provide 1:1 care to a woman in the pool and to have two midwives present at the birth. However, the general view was that waterbirths are no different from traditional births so the midwives questioned the rule requiring two midwives at the birth unless one was being supported to gain skills.

Two of the participants had previously worked as labour ward co-ordinators. They both admitted that they had denied women the chance to use the birthing

pool '*because the ward was busy*' and, by doing so, had upset the midwives involved (Midwife 3, 4). At the time they had decided that they needed to '*prioritise the work*' (Midwife 3, 4) and in busy times claimed that labour ward '*tended to be a conveyor belt*' (Midwife 4) which resulted in the '*niceties of birth being sidelined*' (Midwife 3).

Finances

Warm water was deemed to be a cheap method of providing women with pain relief in labour compared with pharmacological drugs and epidurals. Midwives also thought that these women were more likely to have a straightforward normal birth which is more cost-effective for the NHS compared with an instrumental or caesarean birth.

5.6.2.13.6. Description and exploration of the Organising Theme 'Legal Issues'

This Theme comprises four Basic Themes: Policies and Guidelines, Emergency Events, Litigation Fear, Risk Assessment. The name Legal Issues was given to this Theme because all the Basic Themes are concerned with trying to avoid adverse events and complaints.

Policy and Guidelines

Guidelines and procedural documents were seen as important to midwives to aid and support practice and it was thought essential that they should be followed

correctly. However, there was the conflicting view expressed that guidelines can '*limit the role of the midwife*' (Midwife 2).

Emergency Events

The thought of having to conduct an emergency evacuation of the pool caused anxiety to midwives. Midwives acknowledged it was important to have practice drills covering evacuation of the pool should an emergency event occur, such as a woman '*fainting*', or '*shoulder dystocia*' (Midwife 2).

Litigation Fear

When asked whether they feared the risk of litigation, most midwives felt that if good guidelines were in place, and they followed them, there was no greater chance of being sued for malpractice than with a traditional birth. They also thought that if women were '*risk assessed correctly*' (Midwife 1, 3, 5) the chance of litigation would be reduced. The midwives thought that litigation would be a greater risk if the service was not set up correctly. Another anxiety concerned midwives who had to support women having waterbirths when they '*had no training*' (Midwife 1). This was seen as unfair to the midwives and a risk the organisation should not take.

There were also seen to be advantages for maternity services who offer a waterbirth service. It was thought that there would be '*fewer complaints*' from women as they would be more satisfied with their birth experience (Midwife 3, 4).

Risk Assessment

There was the general consensus that risk assessment of women, before they entered the pool, was important to ensure that they '*fit the criteria*' (Midwife 1, 3). Two midwives were anxious about taking over care from another midwife in case the first midwife had not '*risk assessed*' the woman '*correctly*' before she entered the pool (Midwife 3, 5). Another midwife was anxious in case she herself had incorrectly assessed a woman before allowing her to use the pool (Midwife 5).

5.6.2.14. Summary of the Network

All the six Organising Themes have their own particular impact on any implementation and the sustainability of a waterbirth service. The first Organising Theme was Management of Change. When interviewing the midwives, it was clear that an enthusiastic leader and supportive management were thought to be crucial to the implementation process. This was especially important in view of the fact that midwives were disillusioned with the way previous changes had worked out. To overcome these attitudes, it was recommended that midwives be informed and consulted about the implementation throughout the process.

The second Organising Theme, Well-being, was the effect the waterbirth service had on the people involved with the service. The midwives interviewed reported that they were confident to support women in the pool, but spoke of colleagues who were not able to use it because of lack of confidence. The midwives claimed

that women who had waterbirths achieved good childbirth outcomes and that, compared with pharmacological methods of pain relief, waterbirths were beneficial for the baby. Supporting women in the pool increased their job satisfaction as they enjoyed using all their midwifery skills.

The third Organising Theme, Professional Skills, revolved round midwives' professional skills. Training was judged to be important in increasing the midwives' knowledge base about waterbirths and in ensuring that they were confident when using the pool. The midwives stated that waterbirths were part of the normal care they should offer to women in their professional role.

Organisational Culture was the fourth Organising Theme to emerge. Midwives acknowledged it was important for women to have good information about waterbirths so that they themselves could choose whether or not to use the pool. However, it was perceived that doctors prevented women and midwives from using the pool by showing their disapproval. They also tried to get involved in the care of women in the pool by asking midwives how their labour was progressing in what the midwives regarded as an intrusive manner. They then tried to influence the decision-making process in a way which midwives perceived as undermining their professional role.

The fifth Organising Theme, Resources, emphasised that new services needed to be financed correctly to ensure successful implementation. Midwives appreciated

that equipment was expensive, but thought that if a maternity service wanted to provide a waterbirth service, it should be adequately staffed and all necessary equipment purchased.

The sixth Organising Theme to emerge, Legal Issues, covered the legal aspects which need to be considered when introducing a new service to ensure that it provides a good standard of care. Midwives recognised that they needed to be competent to undertake risk assessment of women, and that guidelines and policies should be in place to support them.

If a maternity service considers these six themes when planning, implementing and offering a waterbirth service, it would greatly increase the prospects for a successful implementation and continued viability of the service.

5.6.2.15. Interpretation of the Patterns

The analysis of the midwives' interviews revealed clear areas which need to be considered when planning a waterbirth service. Many aspects of the Organisational Themes are inter-related and difficult to separate. For example, low staffing levels (Organisational Theme: Resources) can prevent a woman achieving a waterbirth because the unit's guidelines (Organisational Theme: Legal Issues) require that two midwives are present at a waterbirth. This is typical of a large organisation such as the NHS which contains within it competing

interests which may indirectly hinder or block service improvements. Midwives have had experience of many service changes over the last twenty years and there is evidence that they have become disillusioned with the results of past changes. Now this disillusionment is in danger of undermining the way they accept future changes. In order to overcome this problem, the midwives participating in this small study recommended that midwives be involved at the start of any reorganisation so that they can understand what is happening and why. They also acknowledged that it is important to have a leader who is enthusiastic and can encourage other midwives to embrace the changes. This advice would appear to back the recommendations of the NHS Modernisation Agency (2005) about how to manage human dimensions of change by communicating and helping staff to understand the vision to improve services through change.

The Government recommended in 1993 (DH, 1993) that maternity units should have a birthing pool. The Royal College of Midwives (RCOG & RCM, 2006) has stated that all midwives should be able to support women in a birthing pool, and that it is part of the normal role of a midwife to do so. However, there was evidence from the interviews that, in the participants' experience, not all midwives are able to fulfil this requirement of their professional role. One of the reasons appears to be a lack of training and subsequently a lack of support for midwives to enable them to become confident in using the pool. It would appear that there are inadequate numbers of confident and competent midwives in maternity units who are required to support training midwives. It does seem extreme that one

participating midwife obtained her waterbirth training by taking annual leave to enable her to work in another maternity unit. Through this experience, she was able to shadow midwives who were skilled at conducting waterbirths. That was the only practicable way she could obtain her skills. She returned to her own workplace and proceeded to encourage midwives to undertake waterbirths by cascading her knowledge and enthusiasm throughout the unit.

If a maternity unit wishes to provide a waterbirth service, which is equitable, it is in its best interests to ensure that all midwives are confident and competent to undertake waterbirths. Firstly, there is evidence from the interviews that the midwives, once they became confident, enjoyed supporting women in the pool and achieved a greater sense of job satisfaction. Secondly, if midwives are competent, there is less risk of any adverse events occurring. Thirdly, there will be fewer complaints from women. There are two particular areas where an equitable waterbirth service can be undermined. Firstly, national maternity service surveys (HCC, 2007, Redshaw & Heikkila, 2010) have demonstrated that women report they are not able to obtain the method of pain relief they request. Secondly, women may not be able to achieve a waterbirth. There are several reasons for this. When a labour ward is busy, there may be inadequate staffing to provide 1:1 midwifery care to a woman in the pool. The midwife to whom the woman is allocated may not feel confident to support her in the pool. If a unit has only one pool, which is occupied, then a woman cannot have a waterbirth unless it becomes vacant before her baby is born.

From the interviews it is evident that the culture of a maternity unit can impact on the waterbirth service. The participating midwives spoke of some midwifery colleagues who preferred a medical way of working and to use technology instead of a waterbirth. Doctors also voiced negative views on waterbirths and tried to intervene in the care of women using the pool.

However, there was much that was positive to be gleaned from the midwives' interviews. Generally, the midwives perceived that women had a positive birth experience when they achieved a waterbirth and that there were no problems for a baby born in water if all was straightforward during the labour. The midwives themselves enjoyed their role of supporting women in the pool and had a more relaxed relationship with them. The participating midwives also enjoyed supporting other colleagues who were gaining their waterbirth skills. If a maternity service takes into consideration all the Basic Themes derived from the interviews there is every reason to believe it can achieve the Global theme of 'the successful implementation of a sustainable waterbirth service'.

5.6.2.16. Discussion of the Semi-Structured Interviews

These interviews were conducted in order to obtain information about midwives' views and experiences of waterbirths. The interview schedule was based on the Themes obtained from the literature review which explored midwives' attitudes to service reorganisation and new practices. The interviews were then undertaken

to confirm that the Themes were relevant to waterbirths and to ascertain whether any additional themes would be uncovered which related specifically to setting up and running a waterbirth service. This was important because the Themes which were obtained from the literature review and the midwifery interviews would be used to generate the statements for the Q Methodology research. It was important to ensure that the Q Sort statements had content validity.

The five midwives who participated were recruited opportunistically by the researcher. In the interviews all the midwives declared that they were supporters of the waterbirth service. It is acknowledged that the participants were ex-midwifery colleagues who the interviewer has maintained contact with over a number of years. This may have restricted the comments made by the participants because the interviewer is known to be supportive of waterbirths. One of the dangers in this situation is that participants give 'socially acceptable' responses (Rees, 2003). However, the interviewer tried to ensure that she made no comments about waterbirths which would indicate her reactions to the participants' responses. By using semi-structured interviews the researcher was able to learn about midwives' experiences of waterbirths yet the participants were able to feel more 'in control' and 'more valued' because the interview concentrated on how they themselves viewed waterbirths and they were encouraged to raise any additional issues as they thought of them (Rees, 2003). The benefits for the researcher were that she could ask follow-up questions if she was uncertain of any comments made by the participants: furthermore, the data were available immediately. It was felt that overall the data obtained were more

informative than what would be provided by a questionnaire. However, one drawback is that the data analysis process is more time consuming than that derived from a questionnaire.

The midwives were able to provide revealing information about their experience of trying to obtain training. They were also able to describe the benefits they gained from using the birthing pool, the problems they had when trying to offer the service and the concerns that they had about waterbirths. They also discussed the attitudes they had encountered from midwifery colleagues and the reasons which they felt explained why the waterbirth service was not being utilised as often as it could be. It is acknowledged that these were the views of only the five participating midwives. However, this does not necessarily limit their usefulness because the analysis of the interviews has reflected and reinforced the data and Themes obtained from the literature review.

5.6.3. Comparison of Themes Obtained from the Literature Review with the Themes Obtained in the Midwifery Interviews.

The same Organising Themes were obtained from both methods of data collection. However, there was one difference. In the Literature Review the theme 'Staff Well-being' was identified rather then the more general 'Well-being' theme which emerged from the midwives' interviews. This was probably because the literature analysed in the review concentrated on midwives' own experiences

of change, while in the interviews the midwives described how they thought waterbirths impacted on the well-being of the woman, the fetus/baby as well as midwives.

When comparing the Basic Themes, a greater number emerged from talking to the midwives about their experiences than were obtained from the analysis of the literature review. This may reflect the fact that the majority of literature used for the analysis was written several years ago and that the inclusion criteria might have been too narrow. When interviewing the midwives, more Basic Themes emerged which were related to Organisational Culture. These reflected the issues which midwives had experienced in their practice when they had tried to offer a waterbirth service.

The interviews allowed the researcher to probe comments made by the midwives to gain greater understanding of their views and experiences. One of the reasons for undertaking the semi-structured interviews with midwives was to find out whether there were any additional Themes to be identified from the midwives themselves regarding their views on waterbirths specifically. As more Themes were obtained, this justified carrying out the interviews. The close parallel between the Themes obtained from the literature review and the midwives' interviews suggests that the findings have a construct and validity which justifies their use in formulating the Q Sort statements.

Figure 5.4. provides a Venn diagram to illustrate the comparison of the Basic Themes which were obtained from the literature review and those obtained from the midwifery semi-structured interviews. In the centre are the Basic Themes which arose in both data collection methods.

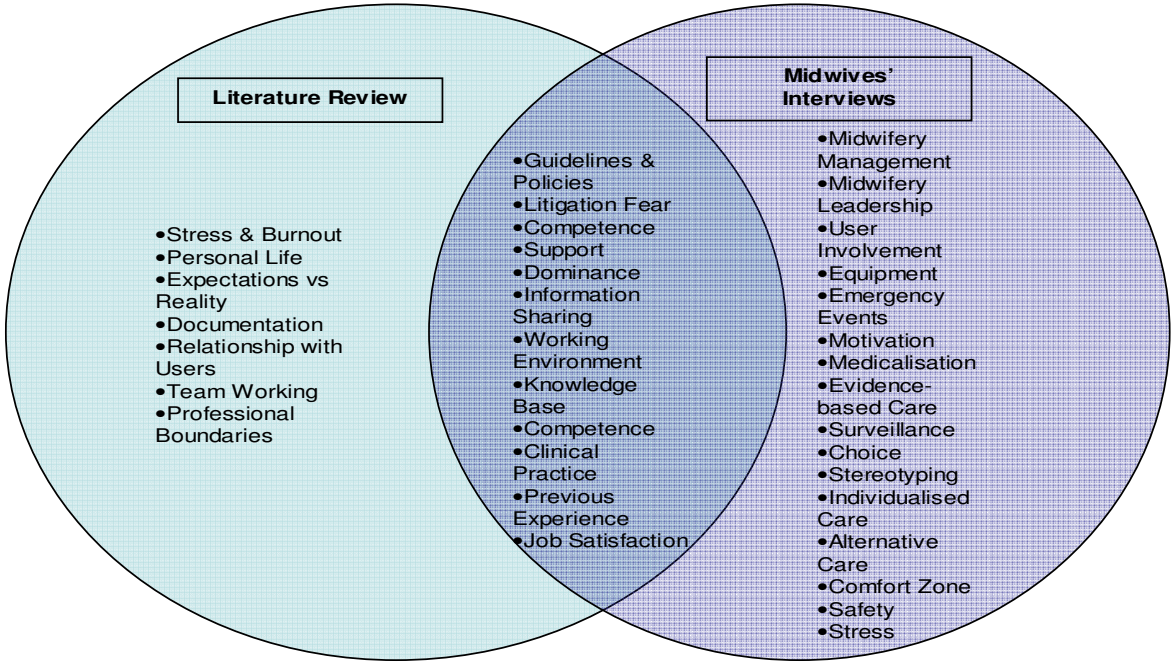


Figure 5.4: Venn Diagram Illustrating the Comparison of the Basic Themes obtained by the Literature Review and the Midwifery Interviews. (The Basic Themes in the centre were obtained by both methods of data collection)

5.7. Concourse Statements

From the thematic analyses of the literature review and semi-structured interview statements were drawn-up to reflect the midwives' views and some were direct quotes. The concourse also contained statements and comments obtained from the waterbirth study's six weeks postnatal questionnaire (Chapter 4). In total, 130 statements were collected.

The concourse statements were examined and categorised into the main themes which were used to form the Q set: Management of Change, Well-being, Staff Well-being, Professional Skills, Organisational Culture, Resources, Legal Issues. Statements which were replications, unclear, or factual were excluded. The number of statements was reduced to 41 to form the Q set (Q sort pack). When the statements had been chosen preparations were made to commence the Q administration process.

5.8. Preparations for the Q sort

The researcher prepared packs to give to midwives. Each pack contained:

- Information sheet (Appendix 18)
- Consent form (Appendix 19)

- Q set: the 41 statements (Appendix 20) printed on numbered cards (6cm x 3cm)
- Detailed written instructions: (Appendix 21)
- Form 1: Midwifery Questionnaire: to obtain brief demographic data (Appendix 22)
- Form 2: The Q sorting grid: to aid the sorting process and a reminder of the umbrella question (Appendix 23)
- Form 3: Q sort table: for the completed Q sort to be transcribed (Appendix 24)
- Form 4: asking for explanations about the decisions made about ranking of statements during the Q sort (Appendix 25)

If a participant decided to complete the Q sort alone, a stamped envelope addressed to the researcher was also included in the pack.

5.9. Pilot of Q sort

The Q sort process was piloted with two retired midwifery colleagues of the researcher to check that the instructions were clear and comprehensive and that the statements were unambiguous. Minor changes were required to two statements to ensure it was clear that the statement related to 'waterbirth' and not water immersion. These two Q sorts were not included in the research because of the statement changes, and demographic data were not collected.

Once the Q sort pilot had been completed, the preparations for the study were completed. The following chapter reports the second, third and fourth stages in the Q Methodology process.

CHAPTER 6: A Q METHODOLOGY STUDY TO EXPLORE MIDWIVES' VIEWS ON WATERBIRTHS

This chapter reports the final stages of the Q Methodology Study: administration of the Q sort, the results and conclusions drawn about the attitudes midwives hold on waterbirths.

6.1. Stage 2: Administration of the Q sort

6.1.1. Selection of the P Set

As this study aimed to examine midwifery attitudes towards waterbirths, the P set comprised UK registered midwives who were currently practising as midwives: purposive sampling (Barchak, 2003). A variety of midwives was invited to participate ranging from recently-qualified midwives, independent midwives, managers and midwives in specialist roles. The aim was to recruit a representative sample of UK midwives who would influence whether a woman may or may not be able to achieve a waterbirth. For example, the midwives in management and specialist roles would normally be the drivers of new practices in a maternity unit and be involved with the development of midwifery guidelines and policy documents. Therefore, the viewpoints of all the various midwifery roles were consulted for this study.

Opportunistic recruitment was carried out by the researcher. Contact with the midwives was gained by attending midwifery meetings, and talking to colleagues outside the NHS and by circulating information on a midwifery email discussion website.

6.1.2. The Q sort Process

Midwives were able to undertake the Q sort at a location of their choice outside work hours. Midwives were given an initial verbal explanation about the study, an information sheet (Appendix 18) and more detailed written instructions to help them while carrying out the Q sort (Appendix 21). They were then given the opportunity to complete the Q sort with the researcher, or by themselves. This allowed midwives to choose the appropriate time to complete the sort while free from distractions. It has been noted in previous research using Q Methodology that there were no significant differences in results whether the sort was completed face-to-face with the researcher or by a postal administered sort (Van Tubergen & Olins, 1995). The midwives came from a large geographical area which meant that it would be impracticable for the researcher to administer the Q sorts individually with each participant. By using postal administration the number of midwives participating was increased but it reduced financial costs and researcher time by avoiding travel time.

Before starting the process midwives were asked to complete a short demographic questionnaire (Appendix 22) to obtain relevant personal information from them, such as their age, where they work, number of waterbirths they have been involved with and waterbirth training.

To aid the Q sort process, participants were given a Q sorting Grid (Appendix 23) which reminded them how many statements were to be placed in each column. The Sorting Grid also included the umbrella question which midwives had to apply to each statement while sorting (Donner, 2001). This was:

***'To what extent does each statement represent your viewpoint or experience of waterbirths'*.**

When midwives were ready to start the Q sort, they were first asked to check that the Q set pack contained the correct number of cards. They were then asked to read the statements and sort them into three initial piles: the statements they agreed with, statements they disagreed with and the remaining statements which they felt ambivalent about in a third pile.

Once they had three broadly-sorted piles of cards, midwives were then asked to focus on the 'agree' pile and further organise the cards into the appropriate number of slots for '+1', '+2', '+3', and '+4' ('strongly agree').

Once the agree pile had been sorted, midwives were then asked to focus on the 'disagree' pile of cards and to perform the same sort with the appropriate number of cards for '-1', '-2', '-3' and '-4' ('strongly disagree'). The midwives were then asked to check the remaining third 'neutral' or ambivalent pile, examine the statements afresh and allocate the cards to the appropriate rank.

Once the Q sort had been completed the midwives were asked to check all the cards to ensure that they had been placed in the correct column and to make any changes if necessary. Once every card had been checked and the midwives felt sure that the completed Q sort accurately represented their thoughts and experiences of waterbirths, they were asked to write the number of each statement card on the answer sheet, or Q sort Table (Appendix 24).

Midwives were then asked to complete an additional form (Form 4: Appendix 25.) to explain why they had sorted each of the cards into columns '-4', '-3', 'Neutral', '+3' and '+4'. This was so that midwives could elaborate on their individual point of view in order that a greater understanding could be gained of their thoughts while they were completing the Q sort. Those statements which scored -4, -3, +3, and +4 are of most interest to the researcher, but the statements 'scored 0 may also be revelatory by virtue of their lack of salience' to the participants (McKeown & Thomas, 1988).

6.2. Stage 3: Data Analysis

The demographic data were analysed using SPSS vs 17.

The Q sorts were analysed using the software package PQMethod vs. 2.11 (Schmolck, 2001) following the process outlined by Donner (2001).

6.2.1. Midwifery Demographic Questionnaire

Recruitment of midwives was carried out over three months. Q sort packs were given out to 43 midwives. Thirty-four Q sort packs were returned to the researcher, with 31 completed correctly. Data sets which were incomplete, or incorrectly completed, were excluded from the analysis. One midwife, who consented to participate via the midwifery email discussion site, returned the pack saying the task 'was too complicated', another returned the pack with the Q sort uncompleted saying 'she had run out of time'. The majority of the midwives opted to complete the Q sort alone without the researcher, at a convenient time to suit them, and returned the paperwork at a later date. Six completed the Q sort in face-to-face sessions with the researcher.

6.2.1.1. Profile of Midwives

The baseline characteristics of the midwives who participated are shown in Tables 6.1. and 6.2. The majority of the participants (87%) were aged between 41-60 years, which is older than the national profile of midwives in which more than two thirds of midwives are over 40 years old and 25% are more than 50 years of age (Midwifery 2020, 2010). The majority of participants worked part-time (*n*=20) and most worked in the NHS (*n*=29). Twenty-nine midwives had been involved with birthing women in the previous year. Midwives in most hospitals nowadays rotate between the hospital labour ward, antenatal/postnatal wards and community so may not care for labouring women every year. One of the two midwives who had not been involved with a birth in the previous year worked in the community and the other was working in a specialist role. Two midwives worked as independent midwives and two other participants combined NHS jobs with independent practice. One participant had just started working as a newly qualified midwife. The others had been working as midwives for five years or more.

All the midwives said that women had the opportunity to have access to a birthing pool in their maternity hospitals, and the two independent midwives owned birthing pools and hired them out to their clients. All midwives had had experience of waterbirths, although the numbers varied, with nine midwives

having been involved with fewer than ten waterbirths and four midwives with more than 50 waterbirths.

Table 6.1.: Work details of midwives participating in the Q sort.

(The number of relevant responses)

	Minimum	Maximum	Median[Mode]
Years working as a midwife (31)	0.2	38	15 [15]
Births in Unit (29)	16	9560	4700 [5000]
No. of births involved in last year (31)	2	150	16 [50]
Total no. of waterbirths (31)	1	150	15 [10]

Table 6.2.: Characteristics of midwives participating in the Q sort

Age Range	Years	%
• 21-30	0	0
• 31-40	4	12.9
• 41-50	12	38.7
• 51-60	15	48.4
• 61-70	0	0
Employer		
• NHS Foundation Trust	8	25.8
• NHS Trust	19	61.2
• Private Hospital	0	0
• Independent Midwifery Practice	2	6.5
• NHS & Independent Midwifery	2	6.5
Working Hours		
• Full time	10	32.3
• Part time ≤ 18.75	5	16.1
• Part time > 18.75	15	48.4
• Bank	1	3.2
Area of Work		
• Hospital	10	32.3
• Community	13	41.9
• Specialist Role	4	12.9
• Other	4	12.9

6.2.1.2. Waterbirth Training

Midwives were asked about the training they had received for waterbirths. Table 6.3. gives the responses. However, it was noted that only 19 (61.3%) midwives had attended a formal waterbirth workshop. Two midwives had received no training in waterbirths.

Table 6.3.: Illustrates the training which midwives had received for waterbirths (may be more than one method of training per midwife)

Training	Number of Midwives	%
Formal workshop: at least 6 hours or more	11	35.5
Formal workshop: less than 6 hours	8	25.8
Practical 'hands-on' training with midwife	26	83.9
Supervised with an experienced waterbirth midwife	19	61.3
Read journal/books/guidelines for waterbirth	26	83.9
Watched waterbirth video	19	61.3
Skills drill for emergency evacuation of pool	22	71.0
Practical experience of emergency evacuation of a woman from pool	9	29.0
Self-taught	9	29.0
None	2	6.5
Other	2	6.5

The questionnaire gave midwives a chance to make additional comments about the provision of a waterbirth service and their experience of waterbirths. The full list of responses can be seen in Appendix 26. The comments were examined and the majority concerned six topics:

- lack of pool use which they felt was because hospitals did not promote the waterbirth service:

'*This hospital is not proactive with waterbirths'* – Midwife 24.

'*While it often sits unused I feel we could be doing a better job of promoting it'* – Midwife 23

- the culture whereby the labour ward and maternity unit did not support waterbirths was another concern:

  '*More chance of having one if you have a home birth'* – Midwife 21

  'Waterbirth from a labour ward point of view has a culture of 'I don't do waterbirths'!' – Midwife 15

  'In my opinion waterbirths are seen as too much work…. Midwives feel waterbirths are not straightforward' – Midwife 16

  '*Depends on management attitudes as to whether waterbirths are promoted'* – Midwife 30

- staff are not available to care for women when they request the pool:

  '*Many women are denied the choice of a waterbirth due to staffing levels'* – Midwife 25

  'In hospital more chance of there not being a midwife to look after a woman' – Midwife 21

- the need for more pools:

  'There is only one pool available but inflatable pools are used but only if midwives can inflate them' – Midwife 1

  '*Having just one pool at hospitals…… I feel is a sign of their lack of choice for women. Hospitals should have two pools'* – Midwife 28

- positive comments about midwives' experience of enjoying waterbirths:

  'I have only positive experiences with waterbirths both at home and in hospital' – Midwife 24

  'I love them' – Midwife 28

- benefits when women used water:

'I have had very positive experiences by caring for women in the pool to help with pain relief and also birthing in the pool'
Midwife 8

'My friend just wanted to use water for pain relief but ended up feeling too relaxed to get out' – Midwife 18

'I have experienced that waterbirths are the 'easiest' of all births with minimal input needed by the midwife' – Midwife 16

Generally, midwives stated that '*hospitals only offer waterbirth to women who fit the low-risk criteria*' (Midwife 28). The same midwife felt that women should be offered the use of the birthing pool if they have problems, but to use it '*as a form of pain management'* with '*the option of getting out of the pool for the birth*…..'. Another participant (Midwife 18) had experience of a vaginal breech delivery in the pool. One midwife reported that her hospital was making plans *'to install a birth pool to support VBAC'* (Midwife 30). It may be that some maternity units are more flexible with their criteria for pool use.

6.3. Q sort results

Midwives who reflected on their experience of undertaking the Q sort had mixed responses. Some found it interesting as it made them think about their attitudes to waterbirths. One actually decided to find a waterbirth study day to obtain more information with the aim of increasing her confidence. However, three midwives, who carried out the Q sort with the researcher, did state verbally that they felt a bit frustrated as they had to place a statement which they slightly agreed with in the 'neutral' column or rank as 'disagree'. This occurred because they had filled

all the cells in the positive areas of the Q sort grid. However, they were reassured that there is no right or wrong column to place the statements. They were informed that they needed to sort according to their views on the statement in question compared with the other statements and that they were then required to make a decision with the options available.

The next section will explain the steps carried out to obtain the findings.

6.3.1. Extracting the initial factors

The steps undertaken to analyse the data were:

- **Principal Components factor analysis**

This provided a correlation matrix (Appendix 27) which reflects the relationship of each Q sort configuration with each other Q sort configuration. An initial factor analysis was then performed. Eigenvalues were obtained for each factor. Using the eigenvalue >1 suggests that four significant factors are present and that they account for 73% of the variation (Table 6.4).

Table 6.4.: Eigenvalues from the Unrotated Factor Matrix

Factors	1	2	3	4	5	6	7	8
Eigenvalues	18.6394	1.6493	1.2662	1.1111	0.9246	0.8528	0.7643	0.6901
Variance Explained	60%	5%	4%	4%	3%	3%	2%	2%

- **Factor rotation and generation of factor loadings**

Varimax rotation was used in order to maximize the variance between each of the factors (Donner, 2001). The software automatically assigns participants to Factors in order to obtain the subgroups and identify the 'voices' present among the participants to explain the Factor (Donner, 2001). The factors represent the groups of individual midwives who have similar responses to the statements and have been clustered together. Table 6.5. illustrates the results of the varimax rotation. The number in each cell shows the strength of midwife's 'loading' on to the factor (Donner, 2001). If a midwife agrees perfectly with the factor her score could be '1', and if she disagrees with the factor the score could be as low as '-1'. To illustrate this, midwife 31 loads highly (0.75) on to factor 4 but slightly disagrees (-0.10) with Factor 2. More than two participants loaded significantly on each of the four factors: Factor 1 – eleven defining Q sorts, Factor 2 – five defining sorts, Factor 3 and 4 – both had two defining Q sorts.

The significantly loading Q sorts are named Factor Exemplars as they epitomise the pattern that characterises that Factor and so are essential when it comes to defining the Factors (Viewpoints). Eleven midwives did not load on to any Viewpoint.

Table 6.5.: Factor Loadings with x indicating a Defining Sort

Midwife Q sorts	**Factor/Viewpoints**			
	1	**2**	**3**	**4**
Midwife 1	0.2713	0.5372	0.2771	0.5030
Midwife 2	0.7918 x	0.3602	0.1021	0.2201
Midwife 3	0.2227	0.1807	0.8284 x	0.0943
Midwife 4	0.2982	0.4974	0.4796	0.2802
Midwife 5	0.6520 x	0.1148	0.3303	0.4328
Midwife 6	0.5259	0.2058	0.6517 x	0.3001
Midwife 7	0.1499	0.4093	0.3763	0.4255
Midwife 8	0.5483	0.6581 x	0.1421	-0.0036
Midwife 9	0.6859 x	0.1746	0.3980	0.2761
Midwife 10	0.7826 x	0.2678	0.2077	0.3058
Midwife 11	0.3640	0.5592 x	0.0873	0.3773
Midwife 12	0.6229	0.4728	0.0902	0.4422
Midwife 13	0.2445	0.4313	0.0662	0.6310 x
Midwife 14	0.5187	0.3131	0.5468	0.0853
Midwife 15	0.6914 x	0.1434	0.4469	0.2378
Midwife 16	0.7512 x	0.4019	0.1547	0.1932
Midwife 17	0.6837 x	0.2627	0.3517	0.3679
Midwife 18	0.7119 x	0.4658	0.2199	0.0981
Midwife 19	0.4565	0.4536	0.2637	0.4449
Midwife 20	0.1169	0.5596 x	0.4862	0.1573
Midwife 21	0.6222	0.5856	0.0534	0.2689
Midwife 22	0.5445	0.5891	0.2478	0.1049
Midwife 23	0.6317 x	0.3480	0.3989	0.3249
Midwife 24	0.6473	0.5979	0.1403	0.3185
Midwife 25	0.4746	0.2842	0.3443	0.1741
Midwife 26	0.2549	0.7805 x	0.2227	-0.0464
Midwife 27	0.5401	0.4634	0.3824	0.3539
Midwife 28	0.7068 x	0.2673	0.2215	0.3273
Midwife 29	0.7281 x	0.2817	0.3754	0.1273
Midwife 30	0.2665	0.8115 x	0.2741	0.2220
Midwife 31	0.3258	-0.1027	0.1809	0.7514 x
Explained Variation	30%	20%	12%	11%

- **Generation of factor arrays**

The factor arrays (Appendix 28) represent the 'ideal' Q sort for each factor. They enable the researcher to outline the 'nature of the perspective which the factor represents' (Donner, 2001) i.e. the common thoughts of the Factor Exemplars.

6.4. Stage 4: Interpretation of the Results

The final phase of a Q Methodology study is to interpret and draw conclusions from the Viewpoints (Factors) which have emerged. The Viewpoints are given labels which describe the statements which are in the Viewpoint reflecting the midwives' attitudes (Corr, 2001).

6.4.1. Viewpoint 1: Motivation

6.4.1.1. Characteristics

The second column in Table 6.5. indicates the participants whose sorts defined Factor 1. The majority of the midwives who defined this factor were community midwives (*n*=7). Of the other four midwives, one worked in a midwife-led unit, one was in a specialist midwifery role and two were hospital-based midwives. Seven midwives were aged between 41-50 years and four were aged between 51-60 years. The minimum number of years working as a midwife was one year

and the maximum was 34 years. Seven (63.6%) had attended no formal waterbirth training sessions.

The statements of interest to define this Factor are those at the extremes of the ranking scales (-4, -3, +3 and +4). The strong agreement (+4) with statement 11 suggests the view that waterbirths have positive effects on women, which is also reinforced by agreement with statements 13 and 17.

11.	*I think mothers have a more positive birth experience with a waterbirth*	*+4*
13.	*Warm water provides good pain relief during the birth process.*	+3
17.	*I think women who use the pool have a greater chance of a normal birth*	*+3*

There is an agreement with the idea that all suitable women should be offered the chance to use the birthing pool. There is also the strong sense that midwives achieve increased job satisfaction when caring for women using a birthing pool:

10.	*I think all women should be offered a waterbirth*	*+3*
15.	*Conducting waterbirths increases my job satisfaction.*	+3

This Factor demonstrates very strong competence in conducting waterbirths:

2.	*I feel competent to conduct waterbirths.*	+4

The expression of confidence is also reflected in the strong rejection (-3) of statements 9, 12, 1 and 28:

9.	*My lack of confidence in conducting waterbirths means that I don't offer them to women.*	-3

12.	*I have had a bad experience during a waterbirth so don't offer this option any more*.	-3
28.	*There is insufficient evidence-based information about waterbirths to discuss the risks and benefits with women.*	-3
1.	*I think conducting a waterbirth is more difficult than a traditional birth.*	-3

This Factor also suggests a view of wanting to encourage a 'normal' birth for women which is reinforced by the very strong disagreement (-4) with statements 32 and 6:

17.	*I think women who use the pool have a greater chance* of a normal birth.	*+3*
32.	*I prefer to offer women a more medicalised birth*.	*-4*
6.	*I feel stressed when working with women having a waterbirth because there is less technology involved.*	*-4*

When examining the comments, provided in Form 4, written by midwives to explain why they ranked statements -3 or -4, a similar aim was expressed to provide a natural birth by rejecting use of technology and medicalisation of childbirth:

> *Childbirth should be a normal physiological process, no need for technological input in most cases.*
> (Midwife 18)

> *Waterbirths are definitely women led and the 'mess' described in the statement (16) is never an issue*.
> (Midwife 23)

> *Aim is a normal birth, not medicalised birth. I feel no stress because of lack of technology – feel more positive/safe.*
> (Midwife 10)

6.4.1.2. Distinguishing Characteristics for Viewpoint 1

Distinguishing statements define the uniqueness of each Viewpoint and are used to interpret and name each Viewpoint. Table 6.6 illustrates the statements that participants defining Viewpoint 1 have ranked significantly differently from the other groups. The ranking and Z score for statements which distinguish Factor 1 are compared with the ranking and Z scores of the same statements for the other Factors.

Table 6.6: Distinguishing Characteristics for Viewpoint 1

Statement Number	Viewpoint 1 Statements significantly different from overall mean @ p=<0.05 (bold @ <0.01)	Viewpoint 1 *n* = 11		Viewpoint 2 *n* = 5		Viewpoint 3 *n* = 2		Viewpoint 4 *n* = 2	
		Rank	Z	Rank	Z	Rank	Z	Rank	Z
15	Conducting waterbirths increases my job satisfaction	3	1.21	0	0.24	1	0.49	0	0.0
14	I would like more formal training in waterbirths	-1	**-0.47**	3	1.18	3	1.38	-4	-1.77

Viewpoint 1, judging by the statements, could be typified by the term 'motivation'. The motivation for midwives is their belief that women experience positive birth outcomes when they achieve a waterbirth. In attaining positive outcomes for women by conducting waterbirths, midwives enjoy increased job satisfaction.

The thought that the midwives defining this Factor are driven by 'motivation', or by trying to achieve their aims, is reiterated in the comments provided in Form 4 to explain their sorting in +4 and +3 positions. A selection of comments is provided:

> *Positive experience for mother: reduced drugs for pain relief, Quality ↑. Should be normal practice for midwives. Water should be front line for pain management.*
>
> (Midwife 15)

> *I wanted to put one statement positive for mother and one statement positive for midwives.*
> *Satisfied happy mothers = satisfied happy midwives.*
>
> (Midwife 16)

> *Psychology – bath relax, relax more oxytocin, more oxytocin has been related to pain relief. I trust the process and think women labour better and want the best for my family, friends clients.*
>
> (Midwife 5)

> *Normal birth is primary aim of midwifery. Job satisfaction is important to me.*
>
> (Midwife 10)

Therefore, it comes as no surprise that the statistically significant difference between this Factor and the others is that they feel they require no further formal training (p = <0.01), and that waterbirths increase job satisfaction (p = <0.05), which motivates their practice.

6.4.2. Viewpoint 2: Risk assessment

6.4.2.1. Characteristics

The third column in Table 6.5. indicates the participants whose sorts defined Viewpoint 2. Three of the midwives (60%) were midwives working in the hospital environment, one worked in a midwife-led unit and one was a community-based midwife. All worked part-time and had been midwives for between 3.5 – 38 years. Two midwives (40%) had received no formal waterbirth training.

When examining the ranking of the statements for Factor 2 it is noted that there was a very strong agreement with the expression of competence in conducting waterbirths and that all suitable women should be offered the use of the pool:

2.	*I feel competent to conduct waterbirths*	*+4*
10.	*I think all suitable women should be offered a waterbirth*	*+4*

Confidence in conducting waterbirths was confirmed by disagreeing with the following statements:

9.	*My lack of confidence in conducting waterbirths means that I don't offer them to women.*	-3
12.	*I have had a bad experience during a waterbirth so don't offer this option any more,*	-4

There was strong (+3) agreement about the role of leaders:

8.	*Enthusiastic leadership is important to support the waterbirth service.*	*+3*

When examining comments in Form 4, the opinion is reiterated that the support of managers is important in promoting the waterbirth service and increasing the numbers. This may be because midwives need to feel that, if there is an adverse event involving a waterbirth, management will support them. If management does not appear to encourage waterbirths, midwives may feel more at risk when conducting them:

> *My experience is ↑ waterbirths when promoted by management. BUT ↓ when management NOT supporting waterbirths.*
> (Midwife 30)

> *If the managers are enthusiastic then the birthing pool would be offered more and would have a higher uptake by mothers.*
> (Midwife 8)

> *I feel that midwives should be able to perform waterbirths with support and training. Managers should support this.*
> (Midwife 20)

Despite the feeling that midwives were competent to conduct waterbirths there was still the desire for more training:

14.	*I would like more formal training in waterbirths*.	+3

However, there was strong agreement (+3) with the need for risk assessment to prevent litigation and increase safety:

26.	*Risk assessment is important to prevent litigation*.	*+3*
33.	*For safety reasons, I think there should be two midwives present at a waterbirth.*	*+3*

Factor 2 characteristics also demonstrate a negative midwifery attitude to medicalisation of childbirth:

32.	*I prefer to offer women a more medicalised birth.*	-4
6.	*I feel stressed when working with women having a waterbirth because there is less technology involved*.	-3

Other viewpoints were a strong disagreement about environmental concerns and lack of anxiety over water temperature expressed in the following statements:

27.	*Waterbirths should not be conducted in a busy obstetric labour ward.*	*-3*
25.	*It is difficult to maintain the water at the correct temperature during a waterbirth.*	*-3*

This suggests sufficient confidence to support women's choice of a waterbirth in an obstetric unit and demonstrates a lack of anxiety about midwifery care surrounding waterbirths.

6.4.2.2. Distinguishing Characteristics for Viewpoint 2.

The distinguishing statements for Viewpoint 2 are detailed in Table 6.7 and compared with the rankings of the other Viewpoints for the same statements. The statements concern risk assessment and safety.

The viewpoints expressed by Viewpoint 2 are typified by the term 'risk assessment'. It can be seen in Table 6.7 that 'risk assessment is important to prevent litigation' is statistically significant (p=<0.01) compared with the other Viewpoint groups.

Table 6.7: Distinguishing Characteristics for Viewpoint 2

Statement Number	Viewpoint 2 Statements significantly different form overall mean @ p=<0.05 (bold @ <0.01)	Viewpoint 1 *n* = 11		Viewpoint 2 *n* = 5		Viewpoint 3 *n* = 2		Viewpoint 4 *n* = 2	
		Rank	Z	Rank	Z	Rank	Z	Rank	Z
26	Risk assessment is important to prevent litigation	0	-0.21	3	**1.42**	0	0.00	0	0.13
33	For safety reasons, I think there should be two midwives present at a waterbirth	-1	-0.56	3	**1.08**	-1	-0.54	-2	-0.88

The comments provided in Form 4 by the midwives defining this group also mention risk or imply Risk Assessment:

I do worry about high risk women.
(Midwife 30)

For all home births in water two midwives should be present. In a hospital setting – it is preferable.
(Midwife 8)

I would never not offer a waterbirth to a low-risk woman.
(Midwife 8)

6.4.3. Viewpoint 3: Confidence

6.4.3.1. Characteristics

The fourth column in Table 6.5 indicates the participants whose sorts defined Viewpoint 3. Both the midwives who defined this Viewpoint worked as specialist midwives. One combined her specialist role with working as a hospital midwife. Both midwives work part-time and had worked as midwives for 15 and 25 years. One had attended a formal waterbirth training session. One midwife was aged between 31-40 years. The other midwife's age was between 51-60 years. One midwife had been involved with three waterbirths, the other had been involved with 10.

The attitudes expressed by Viewpoint 3 are of confidence in the benefits of waterbirths:

13.	*Warm water provides good pain relief during the birth process.*	*+4*
10.	*I think mothers have a more positive birth experience with a waterbirth.*	*+3*
17.	*I think women who use the pool have a greater chance of a normal birth*	*+3*

and confidence with use of water, which is demonstrated by disagreement with the following statements:

12.	*I have had a bad experience during a waterbirth so so don't offer this option any more*	*-3*
27.	*Waterbirths should not be conducted in a busy obstetric labour ward.*	*-3*
37.	*I worry about the risk of infection for a baby during a waterbirth.*	*-4*
41.	*I am anxious because the baby is born blue and takes a long time to breathe.*	*-4*

There are also positive thoughts about the provision of a waterbirth service being an enhancing form of care while being a cost-effective method of pain relief:

18.	*Waterbirths must be offered by maternity units to enhance the service they provide to women.*	*+3*
36.	*A waterbirth is a cost-effective method of coping with pain during childbirth*	*+4*
7.	*I think providing a waterbirth service is too expensive because of the cost of the birthing pool and other equipment*	*-3*

Despite the confidence with waterbirths displayed by this Viewpoint, there was an expression of not being competent and lacking in confidence to offer women waterbirths. It was therefore not a surprise that there was strong agreement that they would appreciate more formal training:

2.	*I feel competent to conduct waterbirths.*	*-2*
9.	*My lack of confidence in conducting waterbirths means I don't offer them to women.*	*+2*
36.	*I would like more formal training in waterbirths.*	+3

In view of the confidence expressed about waterbirths providing good pain relief and the expression of lack of self-confidence in conducting waterbirths, Form 4 was checked for comments to explain the contradiction. One midwife confirmed that she did not feel competent '*without support'* (Midwife 3).

Both midwives made comments to express strong support about training:

> *I have decided to put myself on a waterbirth update since doing the Q sort. I also lack practical skills and experience.*
> (Midwife 3).

The second midwife, who had worked as a midwife for 15 years, stated:

> *I think there is not enough formal waterbirth training. It is usually done by having a senior midwife pop in and out of the pool room. It is not easy to get good knowledge that way. One can never know enough.*
> (Midwife 6)

However, in Form 4 the midwives once again appeared to provide conflicting accounts about their levels of confidence. The midwives used statements about waterbirths which seem to demonstrate confidence in their use of emphatic language in comments such as:

> *I believe very strongly in normality.*
> (Midwife 6)
>
> *I have picked up very strong messages from the literature and from women that the analgesic effect is good.*
> (Midwife 3)
>
> *I believe in the positive impact of waterbirths*.
> (Midwife 6)

However, these comments may be linked to confidence in the benefits of waterbirths but not their own ability to support women wanting one. When discussing the sorting of statements into the negative ranks of -3 and -4 there is still appears to be the feeling of confidence:

> *I don't believe this is an issue, infection can occur in any birth scenario.*
> (Midwife 3)
>
> *My observation is that babies are calm and happy. No cause for worry.*
> (Midwife 3)

It would appear from the contradictory statements that the viewpoint of this factor concentrates on confidence. The midwives state they are confident that waterbirths are good for women and babies, and are cost-effective. However,

they do not seem confident enough about their own skills to offer waterbirths to women.

6.4.3.2. Distinguishing statements for Viewpoint 3:

The opinions exhibited by Viewpoint 3 are typified by the term ‘Confidence’. Table 6.8 illustrates that the results demonstrate that there is a statistically significant difference in Viewpoint 3 compared with the other Viewpoint groups concerning lack of confidence (p=<0.01), feeling out of one’s comfort zone (p=<0.01) and lack of competence (p=<0.01).

Table 6.8: Distinguishing statements for Viewpoint 3

Statement Number	Viewpoint 3 Statements significantly different from overall mean @ p=<0.05 (bold @ <0.01)	Viewpoint 1 *n* = 11		Viewpoint 2 *n* = 5		Viewpoint 3 *n* = 2		Viewpoint 4 *n* = 2	
		Rank	Z	Rank	Z	Rank	Z	Rank	Z
36	A waterbirth is a cost-effective method of coping with pain	1	0.71	1	0.61	4	1.63	2	0.47
9	My lack of confidence in conducting waterbirths means that I don't offer them to women	-3	-1.45	-3	-1.36	2	**0.54**	3	1.77
35	When conducting a waterbirth I feel out of my comfort zone	-2	-1.08	-2	-0.97	1	**0.39**	-4	-1.64
6	I feel stressed when working with women having a waterbirth because there is less technology involved	-4	-1.57	-3	-1.79	-1	-0.49	-4	-1.64
2	I feel competent to conduct waterbirths	4	1.48	4	1.48	-2	**-1.03**	3	1.77

6.4.4. Viewpoint 4: Safety

6.4.4.1. Characteristics

The fifth column in Table 6.5 indicates the participants whose sorts defined Viewpoint 4. The participants had worked as midwives for less than one year and 26 years. One was aged between 31-40 years and worked part-time as a hospital-based midwife. She had been involved with five waterbirths and attended no formal training workshop. The second midwife was aged between 41-50 years and worked full-time as an independent midwife. She had been involved with 100 births and had attended a formal waterbirth training workshop.

The opinions demonstrated in Viewpoint 4 are that enthusiastic leadership is important:

8.	*Enthusiastic leadership is important to support the waterbirth service.*	*+4*

This view is reinforced by comments in Form 4. As with Viewpoint 2, there are concerns about waterbirth adverse events and managers who are not supportive:

> *In hospital, leadership is important in supporting a philosophy for training and usage and midwifery model.*
> (Midwife 31)

> *Without leadership it becomes a fringe activity for newly qualified midwives open to criticism from older midwives.*
> (Midwife 13)

There is also the issue about safety and competence:

4.	*It is safe for women to stay in water for the third stage of labour.*	*+3*
2.	*I feel competent to conduct waterbirths*.	*+4*

Form 4 also provides confirmation that safety aspects are important to these midwives:

> *There is a lack of equipment to maintain water temp in my unit.*
>
> (Midwife 13)

Another confirmation that safety is an important issue within Viewpoint 4 is demonstrated by strong disagreement for the following statements concerning infection and hygiene:

37.	*I worry about the risk of infection for a baby during a waterbirth.*	*-3*
16.	*I find waterbirths a dirty, messy business*.	*-3*

Safety can still be seen as an important issue because the comments, in Form 4, dismissed the concerns expressed in the Q sort statements:

> *I have none of these anxieties.*
>
> (Midwife 31)
>
> *It had not occurred to me to worry about these.*
>
> (Midwife 13)

There is therefore an agreement within the factor that waterbirths are safe and that they also have benefits for women:

13.	*Warm water provides good pain relief during the birth process.*	*+3*
10.	*All suitable women should be offered a waterbirth.*	*+3*

Although the midwives have expressed this attitude and acknowledged feeling competent to conduct waterbirths they admitted, as in Viewpoint 3, that lack of confidence prevented them from offering women that option:

9.	*My lack of confidence in conducting waterbirths means I don't offer them to women.*	*+3*

However, despite this there is a very strong disagreement with a need for more training:

14.	*I would like more formal training in waterbirths.*	*-4*
35.	*When conducting a waterbirth I feel out of my comfort zone.*	*-4*

There was also strong disagreement about preferring a more medicalised childbirth and lack of technology causing stress:

32.	*I prefer to offer women a more medicalised birth.*	*-3*
6.	*I feel stressed when working with women having a Waterbirth because there is less technology involved.*	*-4*

6.4.4.2. Distinguishing statements for Viewpoint 4

The Distinguishing Statements for Viewpoint 4 are illustrated in Table 6.9. The statements concern issues surrounding confidence (p=<0.01), safety (p=<0.01), practical care (p=<0.05), previous traumatic experience (p=<0.01), environmental issues (p=<0.05), effects on the baby (p=<0.01) and training (p=<0.01). The characteristics exhibited by this Viewpoint are typified by the term 'Safety'.

Table 6.9: Distinguishing statements for Viewpoint 4

Statement Number	Viewpoint 4 Statements significantly different from overall mean @ p=<0.05 (bold @ <0.01)	Viewpoint 1 *n* = 11		Viewpoint 2 *n* = 5		Viewpoint 3 *n* = 2		Viewpoint 4 *n* = 2	
		Rank	Z	Rank	Z	Rank	Z	Rank	Z
9	My lack of confidence in conducting waterbirths means that I don't offer them to women	-3	-1.45	-3	-1.36	2	0.54	4	**1.77**
4	It is safe for women to stay in water for the third stage of labour	1	0.50	-1	-0.03	0	0.30	3	**1.64**
25	It is difficult to maintain the water at the correct temperature during a waterbirth	-1	-0.63	-3	-1.18	-2	-0.99	1	0.28
12	I have had a bad experience during a waterbirth so don't offer this option any more	-3	-1.20	-4	-1.87	-3	-1.18	1	**0.27**
27	Waterbirths should not be conducted in a busy obstetric labour ward	-2	-0.80	-3	-1.52	-3	-1.13	0	-0.07
38	A waterbirth is wonderful for the baby, from water into water, no bright lights, it is such a peaceful birth	2	1.10	2	0.85	2	1.28	-1	**-0.21**
14	I would like more formal training in waterbirths	-1	-0.47	3	1.18	3	1.38	-4	**-1.77**

6.4.5. Summary of Viewpoint Groups

A summary of the important and less important characteristics for each Viewpoint is illustrated in Table 6.10. The bold italics denote aspects which are obtained from distinguishing statements for the Viewpoint.

Table 6.10: Summary of Factor groups.

Factor	More Important	Less important	Name of Factor
1	• ***Job satisfaction*** • Positive birth experience • Good pain relief • Normal birth • Women's choice	• ***Training*** • Traumatic experience • Evidence-based information • Confidence • Anxiety • Medicalisation	Motivation
2	• Women's choice • Competence • ***Risk assessment*** • Litigation • Leadership • Training • ***Safety***	• Traumatic experience • Medicalisation • Stress • Technology • Procedures • Confidence • Environment	Risk Assessment
3	• Good pain relief • ***Cost-effectiveness*** • Normal birth • Enhanced service • Training • Positive birth experience • ***Confidence*** • ***Comfort zone***	• Risk • Anxiety • Evidence-based information • Traumatic experience • Cost • Environment • ***Competence*** • ***Anxiety***	Confidence
4	• Leadership • Competence • ***Confidence*** • ***Safety*** • Women's choice • Good pain relief • ***Procedures*** • ***Traumatic experience***	• ***Environment*** • ***Training*** • ***Effects on baby*** • Comfort zone • Anxiety • Medicalisation • Risk • Hygiene	Safety

Note: Items in **bold italics** are distinguishing statements for the factors

6.5. Conclusion

The aim of this study was to explore midwives' attitudes towards waterbirths and obtain information about their experience of waterbirths. There has been very little research evidence on this topic. Since this work was commenced there have been two studies published which investigated this topic. The first was a

report on a survey undertaken in America (Meyer et al., 2010) where midwifery working practice is very different from that in the UK. In the survey fewer than 20 of the 53 participants had actually helped deliver a baby in water. The majority had just supported women to labour in water. The second was an action research project undertaken in England (Russell, 2011).

Q Methodology was chosen to explore this area because it was felt to be a suitable method to obtain a greater understanding of an issue which has not been investigated in depth before. The methodology enabled midwives to express their viewpoints, or attitudes, about waterbirths. The attitudes held by healthcare professionals may impact on the choices which are offered to women by maternity services, e.g. the offer of the chance to use a birthing pool often depends on whether a midwife who is experienced in waterbirths is available. As providing choice for women in childbirth is an important goal for the NHS (DH, 1993; DH, 2004; DH, 2007), this is an important issue to investigate. There is also evidence that women using maternity services are not offered the pain relief they would like (Redshaw & Heikkila, 2010, McGinnes, 2011; Healthcare Commission, 2007).

Q Methodology uses by-person factor analysis and groups the midwives according to their ranking of statements in the Q sort. It is able to provide evidence as to which statements are typically either rated positively or negatively by midwives loading on to the same Viewpoint. Hence, the midwives who share

similar subjective opinions end up being in the same Viewpoint. Interpretation of the Viewpoints is based on the scores provided for each statement and each Viewpoint is given a descriptive name according to the characteristics displayed.

This study has identified four unique, valid Viewpoints (Corr, 2001). There is some degree of overlap between the different Viewpoints. Viewpoint 1 was named 'Motivation'. The characteristic of Viewpoint 1 was the motivation to achieve good birth outcomes for women by supporting a physiological birth and, in doing so, increase job satisfaction.

Viewpoint 2 was named 'Risk Assessment'. The two statements which were ranked as '+4' were: 'I think all suitable women should be offered a waterbirth', implying that women should be assessed to ensure suitability and 'I feel competent to conduct waterbirths'. The lowest rankings (-4) were for the statements: 'I prefer to offer women a more medicalised birth', which concurred with the findings of Viewpoint 1, and 'I have had a bad experience during a waterbirth so don't offer this option any more'. When examining the distinguishing statements to determine the differences between the other Viewpoints, the statements which were significantly different were: 'Risk assessment is important to prevent litigation' and 'For safety reasons, I think there should be two midwives present at a waterbirth'. Therefore, the characteristic of Viewpoint 2 was defined as needing to ensure that correct risk assessment processes were carried out.

Viewpoint 3 was named 'Confidence'. The two statements which were ranked highest (+4) were: 'Water provides good pain relief during the birth process' and 'A waterbirth is a cost-effective method of coping with pain during childbirth'. This viewpoint expressed confidence that there are no concerns surrounding the effects of a waterbirth on the neonate by strongly disagreeing with the statements: 'I am anxious because the baby is born blue and takes a long time to breathe' and 'I worry about the risk of infection'. This Viewpoint was defined by confidence because many of the statements ranked as being significant were to do with midwives' lack of confidence in their waterbirth skills (p=<0.01) a lack of competence to conduct waterbirths (p=<0.01) and stress because of a lack of technology (p=<0.05).

Viewpoint 4 was named 'Safety'. The strongly held views (+4) were that enthusiastic leaders were needed to support the waterbirth service and that they were competent to conduct waterbirths. There was a very strong disagreement (-4) with the idea that midwives were out of their 'comfort zone' while conducting waterbirths and needed more formal training. There is concern over the waterbirth environment, which is related to safety: 'Waterbirths should not be conducted in a busy obstetric labour ward' (p=<0.05) and disagreement with the statement 'A waterbirth is wonderful for a baby, from water into water, no bright lights, it is such a peaceful birth' (p=<0.01). Finally, there was a very strong disagreement with the desire for 'more formal training' (p=<0.01).

There were areas of consensus among the Factors. There was the general feeling that waterbirths are within the normal practice of a midwife and that midwives enjoy conducting waterbirths as they are using their midwifery skills. There was also the attitude that all suitable women should be offered the chance of a waterbirth and that babies born in water are more alert at birth. Midwives also disagreed that the cost of equipment means that the waterbirth service is too expensive. They also disagreed with the statement that they find waterbirths 'a dirty, messy business'.

However, there are some areas where midwives have conflicting opinions as evident from the examination of the Viewpoints above. The contentious issues concern competency, confidence, working out of one's comfort zone, and the need for more formal training. One surprising finding from the midwives' demographic data was that only 61.3% of the participants had attended a formal waterbirth study session, which may indicate the reason for conflicting views. This study produces evidence that although many midwives feel that they are competent to conduct waterbirths they lack the confidence to offer this option to women. One reason may be that midwives feel uncertain about how managers and midwifery leaders view the waterbirth service. Several midwives made comments to this effect in Form 4.

6.6. Limitations of the Study

This study was an investigation into midwives' opinions and experiences of waterbirths. With 31 participants, only a small number of midwives was sampled, compared with the UK total of 30,000 working midwives (Midwifery 2020, 2010). Unfortunately, only 20 of the participants 'loaded' on to a Factor so 11 Q sorts were excluded from the analysis. However, it is accepted that not all participants will load on a Viewpoint and it is the Viewpoints which emerge which are important not the number of participants (Corr, 2001). Furthermore, all the participants were midwives who volunteered to take part - there was no random sampling, so the participants may not be representative of the midwifery profession. This may have had an impact on the results because the midwives who agreed to participate were quite likely to be supporters of the waterbirth service.

It is acknowledged that some of the statements could have been worded differently to make them less ambiguous for both the midwives completing the Q Sort and the researcher explaining the results. One example is Statement 12: '*I have had a previous bad experience during a waterbirth, so don't offer this option any more*'). There was considerable difference of opinion over this and it is natural for a midwife's previous experience to colour her willingness to offer a waterbirth. However, the statement as presented is a factual one relating to an experience and is not an opinion with which one can agree or disagree. This

makes the statement difficult to rank because a midwife may rank as '-4' if she has not had a 'previous bad experience' or may rank as '-4' because she has experienced such an event but it has not had a lasting influence on her practice. It must be remembered that there is the chance of a traumatic event occurring with a traditional birth. This demonstrates the importance of assessing statements carefully before use in a Q sort to ensure that they represent beliefs or opinions, not merely facts. Better wording of the statement may be: *'I think the type of experience you have when you first conduct a waterbirth must affect whether you will offer it again in the future'*. Another two statements also caused problems, both when midwives' were sorting and when the researcher was explaining the analysis of the results. Statement 30 mentioned that '*there is an increased risk of litigation if anything goes wrong*'. Midwives were uncertain whether this related to purely waterbirth or birth in general. A clearer statement would have been '*I think with waterbirth there is an increased risk of litigation*'. Statement 26 involved two concepts '*risk assessment*' and the need to '*prevent litigation*'. In order to make the statement clearer and less confusing, it would be necessary to form two statements. However, as Statement 30 mentioned the risk of litigation that would not be required in a second statement so an alternative would be '*It is important to risk assess a woman before offering her the birthing pool*'.

6.7. Implications of the study

This is one of the few studies to investigate midwives' attitudes towards waterbirths. The work from this study could be extended to carry out a larger study, either targeting midwives who work in specific midwifery groups, for example midwifery managers or newly qualified midwives, or in different maternity units, to see whether there are differences in views between units and midwifery practice areas. As obstetricians have an important say in the care provided in obstetric maternity units, it would be interesting to conduct a similar study to obtain their views on waterbirths.

If a much larger group of midwives was thought to be required to answer the question about midwifery attitudes to waterbirths, the information obtained from this study could be used to develop a new research instrument, such as a questionnaire for a large national survey. If a large RCT were to be carried out to investigate the safety of the baby having a waterbirth, it would be important to have a greater understanding of midwives' attitudes to waterbirths, using a far larger sample.

Since many midwives said that they felt competent to conduct waterbirths, but lacked the confidence to offer them to women, the reasons for this needs to be explored further. Otherwise, many women will continue to be denied the experience of a waterbirth. It may be that the conflict between competence and

confidence is caused by the fact that midwives are not conducting a sufficient number of waterbirths on a regular basis. They will be unable to practise their skills in order to build up and maintain their confidence. One surprising finding was that the median number of waterbirths undertaken by the participating midwives was 15, with 10 being the most frequently quoted number. This seems a disappointingly low number considering that these midwives appeared to support waterbirths. If maternity units offer a waterbirth service, midwifery managers have a duty to ensure that midwives feel confident by having the opportunity to conduct waterbirths regularly.

This Q Methodology study has revealed that there are midwives who are enthusiastic and motivated to offer waterbirths. If a maternity unit wishes to increase this number, they should try and seek out these enthusiastic midwives and encourage them to motivate and support other less confident midwives.

6.8. Conclusion

In conclusion, this study has provided a new insight into midwives' attitudes towards waterbirths by identifying and combining groups of midwives with similar viewpoints. By doing so, it is possible to understand different midwifery viewpoints which may influence the choices an individual midwife offers to a woman. When managers try to assess why individual midwives do not offer waterbirths to women, it must be remembered that there may not be one simple

reason. This study has identified four different midwifery groups, each one having its own important perspectives on waterbirths.

Information gained about the different Factor groups could be used to take the waterbirth service forward in order to improve women's choice and increase their chances of having a waterbirth. This, in turn, will almost certainly enable many midwives to achieve greater job satisfaction.

There does not appear to be evidence that midwives are anxious about the effects of waterbirths on women or babies, which is similar to findings by Meyer et al., (2010). It may be that increased training and mentorship could help these midwives overcome their concerns.

Finally, some midwives reported to the researcher that they found the Q Sort process frustrating because they were forced to make decisions about statements which did not entirely match their beliefs. They also found it a time consuming process with the number of forms they were asked to complete. However, others enjoyed carrying out the Q sort because the process made them take some time to think about their views on waterbirths and they found it 'different' which was also the experience of Tetting (1988).

THESIS DISCUSSION AND CONCLUSION

CHAPTER 7: DISCUSSION AND CONCLUSION

This thesis has examined waterbirths from the perspective of the neonate, women and midwives in order to assess whether a waterbirth RCT would be feasible to assess the effect of a waterbirth on the neonate. This chapter will review the aims and objectives of the thesis, assess how they were fulfilled and summarise the findings. It will reflect on the methodologies used and the limitations of the thesis. This chapter will also discuss the implications of the studies' findings for midwifery practice and make recommendations for future work.

7.1. Introduction and Reasons for Conducting the Research

For many years maternity services have been encouraged to provide woman-centred care DH, 2007; DH, 2004; DH, 1993). In order to achieve this aim, the issues of choice and informed decision-making have become important to help women make decisions about their care (DH, 2007; DH, 2004; DH, 1993). Fundamental to this is the provision of appropriate information. Unfortunately, as demonstrated in Chapter 2, the evidence-base for waterbirths is poor, especially with regard to the effects on a neonate. Whether there is an increased risk

compared with a traditional land birth remains unclear. Chapter 2 concluded that the current information about adverse events, and their frequency, is limited or contradictory, so further research is required, preferably using the 'gold standard' methodology: a large multi-centre RCT (Badenoch & Heneghan, 2002).

To address the anxieties surrounding rare neonatal waterbirth adverse events, a large RCT would eventually be required because women who use the pool are usually at low-risk of complications. However, many healthcare professionals have voiced their concerns, stating that women would not join a study (Garland & Jones, 1994; Garland, 2000; Garcia & McCandlish, 1999; personal meeting) and, if they did, randomisation would have a negative impact on their childbirth experience by removing choice (Jowitt, 2001; Torgerson & Sibbald, 1998). Because a large trial would be required, this has financial implications and before funding could be achieved it was therefore necessary to demonstrate that women are willing to participate and be randomised to either a water or land birth.

Therefore, to investigate these issues, it was imperative to undertake the RCT reported in Chapters 3 and 4. The methodology included a 'preference arm' which enabled assessment of these concerns by comparing results from women in both arms of the trial (Brewin & Bradley, 1989).

The Operating Framework for the NHS (DH/NHS Finance, 2010, p. 25) states that one key driver for the NHS is patient experience, so this would be an

important consideration when undertaking a research study. As part of the waterbirth study women were asked to participate in a prospective, longitudinal descriptive survey (Chapter 4). Some women reported that they had experienced midwifery resistance towards waterbirths. This would indicate that a woman's ability to achieve the waterbirth she desires may depend on whether the midwife providing care offers her, or supports, the option of using a birthing pool. If so, this would have serious implications for whether maternity services can offer equity of care to all users. As this has an impact on maternal choice and also would affect the ability to conduct a future RCT, it was important that this issue was explored further in order to understand the reasons why.

The NHS Constitution (DH, 2009, p. 52) states that research plays a fundamental role in the NHS and is vital to help improve current and future healthcare care. There have been no previous trials which have randomised women to a method of birth and then assessed women's views on participation (Lavender & Kingdon, 2009) so the results of this study are important to inform future researchers.

This thesis had three aims which would address some of the concerns about undertaking such a trial. These will now be discussed together with the findings and implications for a future trial.

7.2. Aspects of Feasibility Achieved

7.2.1. Feasibility of a Waterbirth RCT

The first aim of this thesis was to investigate the feasibility of undertaking a waterbirth RCT to assess the impact of birth in water on the neonate. The study reported in Chapter 3 is the first waterbirth RCT to be conducted.

7.2.2. Recruitment to the RCT

Reassuringly, this study demonstrated that women were willing to participate in and would join a similar study again, if asked. This suggests that women view participation in a waterbirth study as no different from other research studies where they have willingly consented to be randomised (The CAESAR Collaborative Group, 2010; The Magpie Trial Collaborative Group, 2002; Spiby et al., 2008; Small et al., 2000).

Randomisation does raise some ethical issues about women's choice in childbirth. However, women were given plenty of time to make a decision about participation and knew they were able to decline. Furthermore, if unhappy with the allocation, women were aware that they could change their minds and

withdraw. Therefore, to some extent women were making an active choice for their childbirth experience: that of whether to participate in the study or not.

In view of the doubts that women would chose to participate there was uncertainty as to how long it would take to recruit the 60 randomised women. The study was able to achieve the required recruitment to both trial arms within 10 months. Others have not been so successful. Cluett (2004) investigated the effects of water immersion for women with first stage labour dystocia in a trial which aimed to recruit 220 women within two years. Unfortunately, after two years only 99 women had been randomised and because of midwives' increasing reluctance to refer women recruitment was stopped. From maternity records it was known that five women a week would be eligible for the study (Cluett et al., 2004). One reason given for the poor recruitment rate was that midwives said they were too busy and did not have time to discuss the study with women. Cluett et al., (2004) also identified that research was viewed as unimportant in the busy obstetric unit. A similar picture emerged during the recruitment to the waterbirth study. The number of women known to be eligible for the study was much higher than the number of referrals from midwives. The monthly recruitment figures increased when women became aware of the study because of media publicity and, as a consequence, approached the researcher directly. It would appear that midwives are not aware of the Government's drive to improve care in the NHS by encouraging research (DH, 2010a). Therefore, one important consideration when designing a future trial would be to understand midwives'

reluctance to discuss research and identification of ways to encourage midwives to support recruitment and data collection.

7.2.3. Equipoise

One important ethical consideration when designing a research study is to ensure that no harm occurs to participants (NIHR, 2011) and that the risks of the research are minimal compared with the potential benefits (Smith, 1999; p. 7). It has been stated that recruiting patients to RCTs presents a moral dilemma for clinicians: providing the best personal care to patients and obtaining additional knowledge (Gifford, 2000). It is unethical to undertake a trial if it is already known that one of the interventions in the trial has better outcomes than the other (Smith, 1999), so the researcher should be uncertain at the start of a trial as to whether the intervention or the trial control would be the best treatment/care for the topic under investigation (Tilling et al., 2005; p. 91). This is known as equipoise (Johnson et al., 1991).

It is also important to assess an intervention or treatment for possible risk before it becomes standard care because once it has been introduced to general use it is difficult to withdraw it (Silverman & Altman, 1996). It could be claimed that since waterbirths are now so much part of normal midwifery care and because all midwives should be able to support women in the pool (RCM/RCOG, 2006), it is

too late to undertake a waterbirth RCT. However, there is evidence that the percentage of women having waterbirths has not increased (Redshaw et al. 2007; Redshaw & Heikkila, 2010) and women complain that they are unable to use the pool (Kitzinger, 2005; p. 32) so it is proposed that it would still be possible to undertake a waterbirth RCT in the near future. Where midwife-led units are concerned, waterbirth is an important option for pain relief and such units report high numbers of women having a waterbirth (Nicoll et al., 2005; Baxter, 2006; Winters & Duckett, 2006). In the researcher's obstetric unit there has been a drop in the percentage of women using a birthing pool (from 6% to 4.3%) in the last 10 years, which matches the percentages obtained from recent national maternity surveys (Redshaw et al., 2007; p. 25; Redshaw & Heikkila, 2010; p. 35). Therefore, it is recognised that withdrawal of the option of water immersion from some women for the duration of the trial might cause more problems for a midwife-led unit than an obstetric unit. On balance, it is believed that a large-scale RCT would still be feasible but consideration needs to be given to appropriate host sites.

7.2.4. Compliance with the Randomisation Allocation and Ineligibility for the Intervention

Unfortunately, few of the 40 women randomised to a waterbirth achieved a waterbirth. Other researchers have also reported poor randomisation compliance. One example is the Term Breech Trial (Hannah et al., 2000) where

only 56.7% of women allocated to a vaginal breech delivery achieved it and 10% of women allocated to a caesarean section actually delivered vaginally. Often the non-compliance occurs because the allocated intervention is no longer deemed appropriate for the participant (The CAESAR Collaborative Group, 2010; Spiby, 2008; Small et al. 2000). Another example is a trial which explored the impact of a debriefing programme on women following a traumatic delivery (Kershaw et al., 2005). Midwives withheld the intervention from teenagers who were randomised to receive it because some midwives thought they should not be discussing the next pregnancy with teenagers because it would imply that midwives were encouraging teenage pregnancy (Kershaw et al., 2005).

This is another reason for involving practising midwives at the planning stage to address any concerns they may have with the intervention before the study commences. In the waterbirth study it was unclear why some women did not achieve their allocation because there was no explanation provided in the records. This non-compliance has implications for a future RCT, so needs further consideration of how to overcome this possible risk of bias. To prevent any conflict of interest or ethical dilemmas for midwifery researchers, The Nursing and Midwifery Council (NMC, 2010; NMC, 2008) has produced guidance for midwives working on clinical trials.

In view of the disappointingly high number of women who were later deemed ineligible to use the pool when in established labour, one issue which would

require careful consideration, when organising a future trial, is at what stage of pregnancy or labour it would be appropriate to recruit and randomise women. Some believe that the decision to participate should be made, if possible, prior to labour as there are ethical concerns about obtaining informed consent for research from women when in labour and experiencing pain (AIMS & NCT, 1997). However, initial recruitment and randomisation in labour should not be dismissed as a possibility without further assessment. Women have indeed consented to joining other trials when in labour, often in stressful situations when labour is deviating from normal progress (East et al., 2006; Cluett et al., 2004; Kenyon et a.,2001). However, these trials were investigating an intervention for a childbirth complication: abnormal fetal heart rate, labour dystocia or premature labour. In such cases, women would frequently require some form of intervention, whereas a waterbirth involves a relatively simple choice of pain relief which is one many women have already decided by the time their labour starts.

Therefore, one possible recommendation, in the light of these results, is that women should be consented before labour and then randomised when in labour if still eligible to use the pool. This strategy was used by a RCT investigating midwives' care of the perineum in the second stage of labour (McCandlish et al., 1998). However, there is a difference between the perineal trial and a proposed waterbirth study in that a consequence of the waterbirth trial would be that women randomised to a land birth would have to decide alternative pain relief at short notice or may decide immediately to withdraw from the study if disappointed with the allocation (Torgerson & Sibbald, 1998). Researchers investigating an

early labour home support programme also encountered the problem of women not being eligible for the intervention when labour commenced (Spiby et al., 2008). The researchers discussed whether to delay randomisation until later pregnancy (a change from 34 to 37 weeks of gestation) but concluded that this change would not improve the situation (Spiby et al., 2008). Instead it was decided to increase the sample size by 1000 women to ensure statistical significance was achievable for the primary outcome (Spiby et al., 2008). This could be considered as a tactic for a future waterbirth study if too few women were actually achieving the allocation, but may be controversial when reporting the results. Therefore, one conclusion of the waterbirth study is that the timing of recruitment and randomisation requires further consideration if a multi-centre study were planned.

7.2.5. Sample Size

One aspect which needs to be considered when planning a RCT is the number of participants required to demonstrate statistical significance. The unit of randomisation would be the individual woman. One way to obtain a sample size is to look at results from other trials which have reported neonatal outcomes. However, there are limited midwifery experimental research studies which have investigated the condition of the neonate at birth (Rees, 2003; p. 214). Furthermore, it is difficult to ascertain the best outcome to measure neonatal condition at birth. The Birthplace Study (Birthplace in England Collaborative

Group, 2011) a prospective cohort study comparing neonatal outcomes by planned place of birth had a composite primary outcome of perinatal mortality and intrapartum-related neonatal morbidities: stillbirth after start of care in labour, early neonatal death, neonatal encephalopathy, meconium aspirate syndrome, brachial plexus injury, fractured humerus or fractured clavicle.

The waterbirth study has provided future researchers with power calculations which would indicate a sample size of between 1500 – 2500 women. Admission to NICU is proposed as a primary outcome because of the increased cost implications to the NHS and also because separation of mother and baby causes parental stress (Redshaw, 2005). This has been used as a neonatal outcome in several trials (Spiby et al., 2008; Cluett et al., 2004; Hannah et al., 2000).

There are obstetric and neonatal trials which have recruited more than the 1500 – 2500 women. The EISA Trial recruited 3514 low-risk nulliparous women over a period of 22 months from an initial 11 maternity units (in the second year reduced to 6 clinical sites) to evaluate an early labour support programme for low-risk women (Spiby et al., 2008). The Caesar Study, which investigated different aspects of caesarean section surgical techniques, randomised 3031 women over five years (The CAESAR Study Collaborative Group, 2010). Hannah et al., (2000) recruited 2080 women over a 3 year time period from 121 centres. Parents have also consented for their baby to participate in neonatal RCTs which have also recruited a similar number of babies. One example is the INIS Trial

(INIS Collaborative Group, 2011) which recruited 3493 babies with neonatal sepsis from 113 hospitals during a period of six years.

A survey undertaken for the Association of Medical Charities demonstrated that 97% of respondents perceived NHS research into new treatments as important (IpsosMORI, 2011). Seventy-two percent stated, if they had a medical condition, that they would willingly participate in a research study investigating new treatments (IpsosMORI, 2011). Results from the waterbirth study demonstrated similar findings. The population group of eligible women for a waterbirth study is larger than the pool of potential recruits for trials investigating conditions such as breech presentation or neonatal sepsis. Therefore, it is concluded that a multi-centre waterbirth study aiming to recruit 2500 women would be achievable within an appropriate time period.

The next section will discuss the second aim of this thesis.

7.3. Implications of Randomisation

7.3.1. Women's Characteristics, Expectations, Satisfaction with Childbirth and Thoughts about Participation

The second aim of this thesis was to explore, by undertaking a prospective, longitudinal descriptive survey, women's expectations for childbirth, women's

thoughts about participation and whether randomisation had an impact on their childbirth experience.

7.3.2. Are Women in the Randomised Arm Representative of the 'Normal' Pool Users?

To the researcher's knowledge this is the first midwifery RCT to have a trial design incorporating a 'preference arm'. By doing so, it enabled the collection of additional data about participants' characteristics in order to address concerns about a waterbirth RCT which otherwise it would have been impossible to obtain. A comparison of the two trial arms demonstrated that there were no statistical differences regarding demographic data. There were also no differences in women's expectations for childbirth. The findings from the survey provide greater reassurance about generalisability and indicate that a future trial would obtain results which would be relevant to the women who usually use the pool through choice.

The use of a 'preference arm', or non-randomised arm, in a future trial may enable women who are determined to have a waterbirth to participate, who would otherwise decline randomisation. However, the analysis of such a trial with four arms is controversial. The randomised arms of the trial are likely to be the main area of interest when reporting results (Tilling et al., 2005; p. 94). It should be borne in mind that there may be confounders when comparing participants with

strong preferences (preference arm groups) with the randomised women (Tilling et al., 2005; p. 94) which may distort the results (Peat, 2002; p. 29). However, the waterbirth study demonstrated no differences in maternal demographic data or their expectations for childbirth, so these results indicate that the use of a 'preference arm' in a future trial would not bias the results. The trial arms could be analysed separately and the results amalgamated if there are no differences between the trial arms.

Another aspect of concern surrounding a waterbirth study was the impact of randomisation on women's childbirth experience. The findings in regard to this issue will be discussed in the next section

7.3.3. Randomisation and Satisfaction

This is the first study to randomise women to a method of birth and to assess the impact on satisfaction. It has been suggested that randomised participants who do not get the allocation they desire may feel disappointed and this would have a negative impact on their experience, whereas those who get their preferred allocation are satisfied (Torgerson & Sibbald, 1998). It is claimed that this latter group may show improved outcomes, not because of the actual intervention itself but, because they received the allocation they wanted (Torgerson & Sibbald, 1998). Torgerson & Sibbald (1998) warn, however, this has not been proved and

would not be easy to evaluate. By examining the satisfaction of women shortly after the birth, this trial has demonstrated that there was no statistical difference between the trial arms, indicating that randomisation does not affect satisfaction. However, the measurement was undertaken immediately after birth and others have suggested that women's satisfaction decreases in longer-term assessments such as 12 months after the event (Waldenstrom, 2003; East et al., 2006). Therefore, a future trial may wish to measure maternal satisfaction at several time-intervals.

One encouraging finding was that, six weeks after the birth, a statistically significant number of women who were randomised reported that their childbirth was a fulfilling experience. This was despite many not achieving their allocation; indeed many experienced a very different birth from that which they had anticipated. Therefore, it would seem that the altruistic act of providing information for future parents and healthcare professionals gave them an additional sense of satisfaction and fulfilment. This supports the findings of other researchers (Baker et al., 2005). No detrimental effects on women's childbirth experience were identified in the six weeks questionnaire although it has to be acknowledged that the survey was underpowered. These results indicate that it would be possible to undertake a multi-centre RCT without undermining the women's childbirth experience.

7.3.4. Women's Views on Participation in a RCT Evaluating a Method of Birth

There is little published evidence surrounding women's thoughts about participation in childbirth RCTs. Most trials have examined women's knowledge of the intervention and care received during the trial (Elbourne, 1987; Magee et al., 2007) or their perceptions about information they were given to explain the trial (Kenyon & Dixon-Woods, 2004).

The evidence from the waterbirth study indicates that women welcomed the opportunity to participate in research and provide information, which has been the conclusion of other researchers who have published since the waterbirth study was planned (Smyth et al., 2008; East et al., 2006). It has been identified that timing of recruitment to research projects and the amount of information provided are important to women when considering whether to participate in research and also have an effect on their long-term views about participation (Smyth et al., 2008; Baker et al., 2005). Therefore, one factor which might have contributed to women being positive about joining the waterbirth study was that the researcher discussed at length with each individual woman the trial and the implications of joining. Detailed written information was also provided. These efforts, although time-consuming, may have enhanced the women's experience of participating in a research study. It is difficult to give the personal touch to recruits in a large RCT but with careful consideration and planning these issues could be built in so that women should be able to enjoy and gain from the experience of participation.

There is a recognition that when planning a NHS research study it is important to consult with users of the service, or potential recruits, from the outset to ensure that their views and priorities for the evaluation are included in the research because they will present different perspectives compared with professionals (Hanley et al., 2004). Women are also likely to have a variety of ideas and suggestions for recruitment and retention techniques which may increase the success of the study (Hanley et al., 2004).

The next section will discuss the third aim of this thesis.

7.4. Midwives' Attitudes to Waterbirths

The third aim of this thesis was to explore midwives' attitudes to waterbirths. Personal attitudes are notoriously complex to explore and there is often no logical reason why a person holds a certain viewpoint about a topic (Oppenheim, 1992, p. 175). By using Q Methodology it was possible to obtain an insight into midwives' attitudes to waterbirths and four Factors or 'viewpoints' which influence these attitudes emerged: Motivation, Risk Assessment, Confidence, Safety. There was a very clear message from the midwives who participated in semi-structured interviews that a waterbirth service needs management support and that the organisational culture affects whether the service is successful. This has

also been the conclusion of others (Russell, 2011; Stark & Miller, 2009) and has been the reason for many midwives' lack of job satisfaction (Ball et al., 2002; Kirkham, 1999).

There is evidence that women's preferences for birth are influenced by the options they know exist (Hundley & Ryan, 2004); therefore, if a midwife does not promote the waterbirth service, a woman's choice will be restricted. In addition, if the waterbirth service is not requested, midwives will not gain the skills and confidence to support women and birthing pools will consequently be at risk of closure. This can lead to a vicious cycle. Russell (2011) identified that midwives perceived that waterbirths had 'gone out of fashion' because women were not asking to use a birthing pool, but the reason could be that women are unaware of the availability of a birthing pool. As confirmation of this possibility, midwife-led units have demonstrated that promoting a waterbirth service increases the number of women booking for care and increases women's satisfaction with their birth experience (Nicoll et al., 2005; Winters & Duckett, 2006; Baxter, 2006).

The viewpoints which have emerged should be considered when midwives are trying to encourage others to embrace waterbirths because they impact on several areas of maternity care: women's choice, the ability to provide an equitable service and the role of the midwife. As the previous discussion of midwives' attitudes to waterbirths (Chapter 6) indicates there is sufficient support expressed by midwives for waterbirths to entertain realistic hopes that they will,

with further training, support and encouragement, feel confident to offer waterbirths to women and so widen their range of options for the type of birth they can choose.

7.5. Planning a Future Multi-Centre Waterbirth Study

This section will discuss additional topics which should be considered when planning a future study.

7.5.1. Research Support, Funding and Women's Involvement

It is acknowledged that the Head of Midwifery in 1999 allocated midwifery time to the researcher to plan the waterbirth study and submit a proposal to the Trust for research funding. In the current NHS climate of financial and midwifery staffing constraints, it is unlikely that the researcher would be able to obtain the same support to undertake the study now.

Since conducting the waterbirth study there have been changes in the support mechanisms for researchers undertaking clinical research in the NHS. In 2006 the National Institute for Health Research (NIHR) was set up. Included in this organisation is the Clinical Research Network (CRN) which co-ordinates four research Portfolios. If a future waterbirth research study is deemed eligible for inclusion in one of the NIHR Portfolios, then advice and help is available from the

CRN to organise the study, plan paperwork and data collection and research training for trial support staff.

One requirement for eligibility for inclusion in a research Portfolio is that users or representatives of future study participants should be involved with the planning of the study from the outset (Hanley et al., 2004). Information and examples of user involvement in research is provided by INVOLVE (2012) on their website: http://www.invo.org.uk/.

An additional source of information is RDInfo (2012) who provide advice on their website to help researchers understand the research process and current funding streams: http://www.rdinfo.org.uk/.

7.5.2. Time Period for Data Collection

This study obtained information about the condition of the neonate until the age of six weeks. One recommendation for a future waterbirth study would be a follow-up for a longer period. There have been trials which have reported initial results about the condition of a baby at birth but longer-term follow-up revealed different findings. One example is the Term Breech Trial (Hannah et al., 2000) which changed the clinical care for women whose baby was in the breech position. Initial results demonstrated that delivery by caesarean section was better for the

baby. Obstetricians immediately recommended that women should not have vaginal breech delivery and now many are unable to conduct a vaginal breech birth. However, follow-up of the children at two years of age found that there was no reduction in risk of death or neurodevelopmental delay associated with planned caesarean birth (Whyte et al., 2004). The Oracle Study (Kenyon, 2001) found no difference in outcomes but at the follow-up of children at seven years of age it was found that children whose mother had received erythromycin for pre-term labour with intact membranes had an increase in functional impairment (Kenyon et al., 2008). There was also a risk of cerebral palsy with antibiotic therapy, compared with a placebo (Kenyon et al., 2008).

These examples suggest that longer-term follow-up is necessary in a substantive waterbirth RCT to ensure the detection of any ill-effects on childhood development. If there are developmental differences it would have financial and social implications for both families and the NHS.

7.6. Limitations of the Waterbirth RCT

As in any research, there are limitations that must be acknowledged and may help other researchers attempting a similar trial in the future.

7.6.1. Possible Bias

The RCT Research Process

When conducting a RCT the researcher aims to eliminate bias to ensure that the study results have validity (Polit & Beck, 2012, p. 206). One way is to ensure that the sample size is large enough for known and unknown confounders to be minimised or eliminated (Polit & Beck, 2012, p. 206). As a result of randomisation there should be groups which are similar but which cannot be guaranteed to be identical (Sim & Wright, 2000, p. 92). Although the waterbirth RCT was small it was designed to assess feasibility and it gives future researchers the opportunity to amend the procedures and address any problems which occurred (Polit & Beck, 2012, p. 643). In this respect the study fulfilled its aims but one has to caution that because of its size the results regarding neonatal and maternal outcomes may have occurred through chance.

Another way RCTs eliminate or minimise bias is to blind the women and midwives by concealing the intervention allocation so that they are unable to influence the results by trying to present waterbirths in a positive light (Polit & Beck, 2010, p. 211). However, blinding is not always possible (Polit & Beck, 2010, p. 212) and this was the case in the waterbirth study. It would not be possible to 'blind' women when they would obviously be aware of whether they were in a birthing pool or not. For the same reason, midwives could not be 'blind' to the allocation since they were the ones providing the care to women. It is also

acknowledged once a woman was admitted in labour and the allocation became known to the midwife providing care, that the preferences of individual midwives may also have influenced the chances of whether a woman achieved a waterbirth.

It is also known that women who have the support of 1:1 midwifery care in labour report greater satisfaction levels with their birthing experience (Hodnett et al., 2011). The Trust's guideline states that women who are in the birthing pool are to be provided with continuous midwifery support for safety reasons. Unfortunately, although the aim was for women allocated a land birth to have the same level of 1:1 midwifery care, this was not always possible because of inadequate staffing. It is acknowledged that this difference in midwifery support may have impacted on a woman's childbirth experience and as a consequence affected the results of the satisfaction score and of the postnatal questionnaire.

When the waterbirth study was conducted in 2000/2001 women were not encouraged by the host maternity service to give feedback on their experiences. By asking women to complete the prospective, longitudinal survey the positive results may have been achieved because women welcomed the chance to provide information and gave them a sense of control.

Waterbirth RCT Data Collection

Unfortunately not all the data and samples were obtained by midwives, which was the finding of other researchers (Forde et al., 1999). The fact that data were missing was disappointing because when the study was set up a group of midwives agreed to be on-call to enable participants to achieve the waterbirth allocation and also to help collect the data. The on-call midwives were only requested on two occasions. Unfortunately, it was not possible to ascertain from Labour Ward co-ordinators why they had not taken up this option more often. A future trial would need to consider how to reduce the amount of missing data.

7.7. Limitations of the Q Methodology Research Process

The use of Q Methodology to obtain midwives' viewpoints on waterbirths was an interesting method to use. However, because it was a methodology new to the researcher, it was time-consuming and initially confusing. The study involved many separate stages (literature search, thematic network analysis of the literature, thematic network analysis of semi-structured interviews and Q sorting, Q Analysis and Interpretation of results) and was perhaps too ambitious for a secondary study.

P Set

The sample size was adequate for a Q Methodology study and revealed four Viewpoints held by midwives about waterbirths. However, if a larger group of midwives had been included more Viewpoints might have emerged.

One limitation is that the results of a Q Methodology study reflect the viewpoints of the P set (Farrimond et al., 2010); the participants were midwives who volunteered to carry out the Q sort, so their views may not be representative of the general midwifery profession. The volunteers for this study were likely to be midwives who enjoyed using the birthing pool, so this may have skewed the results. However, these viewpoints will still be valid according to Q Methodology theory.

Generation of the Q Sort Pack

The P Sort Pack was generated from a literature review and semi-structured interviews with midwives. Unfortunately, many of the relevant papers included in the literature review were written in the late 1990s, so the themes generated may be outdated. They were chosen because they looked simply at midwives' attitudes to changes in their working practice rather than the issue of 'taking on' additional roles which had previously been undertaken by doctors. The semi-structured interviews were conducted with midwives who were supportive of waterbirths which would have influenced the themes generated. An alternative method of generating statements would be to use midwifery focus groups, which

may have raised more topical and varied issues midwives have encountered regarding waterbirths.

There was the chance of researcher bias regarding the choice of statements for the Q set, although these were checked by another researcher experienced in Q Methodology. It is acknowledged that some of the statements could have been worded differently to make them clearer to sort and analyse.

Administration of the Q Sort

Ideally, the researcher should be present when the Q sort is conducted to ensure that the participants understand the process and follow the instructions correctly as this may impact on the findings (Corr, 2001). However, because recruitment included publicity via a midwifery internet discussion group, for pragmatic reasons many midwives conducted the Q sort alone. Unfortunately, if all Q sorts were supervised it would have been very time-consuming for the researcher and might have been difficult to get a sufficient number of midwives to participate.

Interpretation of the Results

There could also have been the risk of researcher bias when interpreting the factors. To overcome this, the results were reviewed by another researcher experienced in Q Methodology.

7.8. Implications for Midwifery Practice

It is recognised that the waterbirth study is a small RCT but the data will be useful in providing further evidence to support midwives and obstetricians when women ask for information about waterbirths. There is no evidence that a waterbirth places a baby at more risk than a traditional land birth but this was a feasibility study and midwives should be asking for a larger waterbirth RCT so that midwifery practice can be based on more robust evidence.

The information about recruitment and data collection will be useful to other researchers who are considering setting up another waterbirth study. Power calculations have been provided.

Midwives should be not be fearful about asking women to participate in research because this study has shown that the act of helping to provide information for future parents enhances the childbirth experience. There is certainly no evidence to suggest that it is detrimental to it.

Maternity units should ensure that all midwives are competent and confident to support women to have a waterbirth in order to enable all women who request the pool to have a chance of using it, if appropriate. If this is not the case, some women may be denied their choice of birth and services will be failing to provide an equitable service. It is recommended that midwifery managers should audit

the use of the birthing pool and ask women whether they are getting the pain relief they would like.

Supervisors of Midwives should ask all midwives at their annual review how often they use the birthing pool. If use is infrequent, they should discuss how to increase the opportunity of waterbirth experience and Supervisors should identify a mentor and monitor progress at regular intervals.

Enthusiastic, supportive leadership is important to ensure midwives feel confident and competent to use the birthing pool. Proponents of waterbirths should be identified, within a maternity unit, to help promote the waterbirth service. Maternity services should be aware that midwives report increased job satisfaction if they are able to work in this way. By promoting a successful waterbirth service, maternity units would enhance women's choice and at the same time retain midwives who enjoy enabling women to have a satisfying physiological birth experience.

7.9. Recommendations for Future Research

Several areas of uncertainty have been identified in the course of this thesis which would benefit from further investigation. These uncertainties will now be discussed.

A multi-centre Waterbirth RCT is Required

The waterbirth study has demonstrated that it is possible to undertake a waterbirth RCT without adversely affecting women's birthing experience. Therefore a large multi-centre RCT is recommended. Consideration should be given to replicating this study's methodology by having a 'preference arm'.

Host Sites for a Multi-Centre Trial

It is unknown how many maternity units would be willing to host a waterbirth RCT so this should be explored. Consideration needs to be given to the appropriate type of unit which would be invited to host the trial. The reliance midwife-led units place on water immersion for pain relief may mean they are not suitable.

Recruitment and Randomisation of Participants

There is still uncertainty surrounding the best time to recruit and randomise women to limit the number who are found to be ineligible for a waterbirth when labour starts. It is advised that women are consulted to obtain their views on this issue to find an acceptable and suitable time.

How Often are Women Denied Use of the Pool and Why?

Research should be undertaken to obtain information about how often women have been denied the birthing pool and why. It would give an opportunity to assess the effect on women of being denied their chosen pain relief. Q

Methodology could be used to obtain women's views and experiences. An alternative method would be unstructured or semi-structured interviews.

Midwives' Attitudes to Involvement in Research Trials?

More information is needed on midwives' attitudes to involvement in recruitment to, and data collection for, research studies in view of evidence of non-compliance with research study protocols. Of particular interest would be midwives' thoughts about a waterbirth RCT. This is an important issue because a future trial would need midwives to help with the study processes.

Financial Implications of a Waterbirth

This thesis has not investigated the financial implications of a waterbirth for the NHS. With the drive for efficiency and cost-effectiveness this aspect should be investigated in a larger study.

Maternal Outcomes Following a Waterbirth

This thesis has not investigated maternal outcomes following a waterbirth. A larger trial would be able to investigate this. Suggested areas of interest are perineal trauma, analgesia used, intervention in labour, method of delivery, retained placenta and post-partum haemorrhage.

Midwifery Managers' and Obstetricians' Attitudes to Waterbirths

Information is required about midwifery managers' and obstetricians' attitudes to waterbirths. Results from this thesis, and other studies, indicate that the support of midwifery managers and leaders is vital to ensure the success of a waterbirth service.

Men's Views on Waterbirths

In the 21st century, maternity services are encouraged to involve the woman's partner in decisions about care choices (RCM, 2011a; NCT, 2009; DH, 2007; DH, 2004). There is no information available about men's views on waterbirth. If a woman's partner does not approve a woman may not choose water immersion for childbirth.

7.10. Dissemination of Findings and Future Work

Since publication of the waterbirth study, the researcher has been asked to present the findings to research conferences and the results have been included in a Cochrane Systematic Review (Cluett & Burns, 2009). The researcher is currently working with a multi-disciplinary group planning to submit a proposal to try to obtain funding for a national waterbirth RCT.

7.11. Summary of Significant Findings

This thesis fulfilled the three aims it set out to investigate. Firstly, this study was the first waterbirth RCT to be conducted and confirmed the feasibility of organising a larger RCT. It therefore provides important information to help researchers who may wish to design a future trial. The study also provides power calculations which can be used to determine the participant numbers needed for a future trial. The findings of the study, although small, contribute significantly to the existing waterbirth literature and have been included in the Cochrane review of water immersion for labour and birth (Cluett & Burns, 2009).

Secondly, the prospective, longitudinal, descriptive survey highlighted that women expressed positive views about participation in a RCT and the results from questionnaires demonstrated no differences between the trial arms for women's expectations or satisfaction following the birth. Therefore, these findings should alleviate the concerns and doubts some healthcare professionals have about a waterbirth RCT.

Thirdly, the use of Q Methodology, which is an unusual method for midwifery research, has increased the knowledge base around midwives' attitudes to waterbirth. Four viewpoints were identified which influence whether a midwife

offers the birthing pool to women and these findings are in line with current literature (Russell, 2011).

These studies did not set out to resolve completely the controversial issue of a waterbirth RCT, but they have been able to obtain information about many of the concerns.

7.12. Conclusion

Finally, the studies in this thesis have tackled some difficult questions which needed to be addressed. It has been stated that the organisation of a waterbirth trial is 'fraught with difficulties encompassing both ethical and pragmatic problems' (Bothamley & Chadwick, 1996, p. 131). For a novice midwife researcher to plan and undertake a RCT pilot study was a daunting task and to report positive findings from women is a source of satisfaction and provides a sense of achievement.

This study has demonstrated that it would be feasible to undertake a future RCT without undermining women's childbirth experience. However, it is recommended that strategies should be put in place to ensure midwives' support by enhancing their motivation, confidence and competence to undertake waterbirths. A larger RCT will be able to build on these findings and provide more information for both

midwives and pregnant women. The findings would help them to understand better the issues involved, enable the midwives to give advice from a position of knowledge and confidence, and the women to make a more informed choice. The organisation of such a large study would present a serious challenge but would be of great benefit to all parties.

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APPENDICES

Appendix 1: Published Waterbirth RCT Paper

BJOG: an International Journal of Obstetrics and Gynaecology
June 2004, Vol. 111, pp. 537–545
DOI: 10.1111/j.1471-0528.2004.00132.x

A pilot study for a randomised controlled trial of waterbirth *versus* land birth

Joanne Woodward,[a] Susan M. Kelly[b]

Objectives To assess the feasibility of undertaking an adequately powered multicentre study comparing waterbirth with land birth. To assess whether women are willing to participate in such a trial and whether participation has a negative effect on their birthing experience.

Design A randomised controlled trial (RCT) with 'preference arm'.

Setting District general hospital with 3600 deliveries annually.

Population Women with no pregnancy complications and no anticipated problems for labour/delivery.

Methods Women were recruited and randomised between 36 and 40 weeks of gestation. Comparison of randomised and 'preference arm' to assess any impact of randomisation on women's birthing experience.

Main outcome measures Data were collected at delivery concerning the labour, the pool water and baby's condition at birth and six weeks of age. The main outcome measures are means and standard deviation of cord O_2, CO_2, haemoglobin, haematocrit and base excess; medians and ranges of time to first breathe and cord pH; bacterial growth from pool water samples and neonatal swabs; and maternal satisfaction.

Results Eighty women participated—60 women were randomised. Twenty women participated in a non-randomised 'preference arm'. The babies randomised to a waterbirth demonstrated a significantly lower umbilical artery pCO_2 ($P = 0.003$); however, it is recognised that this study is underpowered. Women were willing to participate and randomisation did not appear to alter satisfaction.

Conclusion This small study has shown that a RCT is feasible and demonstrated outcome measures, which can be successfully collected in an average delivery suite.

Woodward, J. & Kelly, S. (2004) A pilot study for a randomised controlled trial of waterbirth versus land birth.
BJOG, 111 (6): 537 - 545

Appendix 2.: Research Ethic Approval for Waterbirth Study

Appendix 3.: Waterbirth Study Information Sheet

The Pilot Study For A Randomised Controlled Trial To Compare The Effect On The Baby Of Delivery In Water Or On Land

INFORMATION SHEET

You have been asked to consider taking part in the pilot study for a midwifery research project to obtain information on the effect on the baby of a water birth compared with a conventional land birth. A pilot study is carried out to test the research methods to confirm that it is possible to obtain the information and samples required before undertaking a larger study.

The purpose of this leaflet is to explain to you as clearly as possible all the procedures involved before you decide whether or not to participate in the study.

Background information

The Barratt Maternity Home, Northampton has had a birthing pool since January 1998. Women are increasingly requesting to use the pool as a method of pain relief in labour and for the birth of their baby. Many women say they experience a great sense of satisfaction following use of the pool.

However, not much evidence has been collected concerning the safety implications for a baby of being born in water. We would like to undertake this study to collect information concerning your labour, delivery of your baby and the condition of your baby after birth to see if there are any differences between births occurring in water and conventional land births.

Why have I been asked to participate in the study?

We are inviting women, like you, who have not had any problems in their pregnancy and who are suitable to use the water pool, if they would like to take part in the study.

It is hoped to recruit approximately 80 women to the study, which will be conducted to the highest possible research standards. The Northampton Ethics Committee has given its approval to the study taking place in the hospital.

What does it involve if I join the study?

If you did decide to join the study you would be allocated, as by the 'toss of a dice', (known as randomisation) to either, labour and delivery in water, or labour and delivery out of water. This means that you would not have the opportunity to decide yourself whether to use the water pool or not. The design of the study would mean that for every one woman allocated a land birth there would be two women allocated water births.

If you know you definitely want to use water as a method of pain relief for your labour and birth, and therefore would not want to be randomised, we would still welcome your participation in the study 'preference arm'. This means that you would be able to fulfil your wish to use the pool and we would be able to collect the same information that would be collected from the other women in the study.

If you know you definitely do not want to use water as a method of pain relief for your labour and birth, and therefore would not want to be randomised, we would still welcome your participation in the study 'preference arm'. We would like to collect the same information that would be collected from the other women in the study.

As part of this study you would be asked to complete three questionnaires; one late in your pregnancy, one after delivery and another six weeks after the birth of your baby. The first questionnaire would ask questions about your expectations for your forthcoming birth experience, the second would ask about your satisfaction with the birth experience and the final one would ask again about your feelings about the birth and how you felt about participating in the study.

When you are in labour, we would be recording your temperature hourly in addition to the usual observations recorded. If you were assigned to a water birth we would take a water sample before you enter the pool and another when you leave the pool. These samples would be sent to the laboratory to see which, if any, bacteria are grown.

Soon after your baby is born we would take samples of blood from the arteries and vein of the placenta. These would be analysed to find out the blood gasses (the level of oxygen and carbon dioxide), haemoglobin (a pigment contained in red blood cells) and packed cell volume (this is the percentage of red blood cells to plasma). These would give us greater information about the condition of your baby.

Shortly after your baby is born we would wipe his/her ear, mouth and umbilical cord with cotton wool swabs. These samples would be sent to the laboratory to see if any bacteria are on your baby's skin. We would collect all the usual information midwives record about your baby – such as weight, temperature and method of feeding. Should your baby need to be admitted to the Special Care Baby Unit (Gosset Ward) we would obtain information about the reason for admission, treatment required and how many days he/she stayed in the unit. If

blood is taken from your baby for any reason – for example he/she is jaundiced (the skin has a yellow tinge to it) when a few days old – then blood would be taken at the same time to check haemoglobin and packed cell volume.

We would also like to ask you, when your baby is six weeks old, how your baby is getting on and whether he/she has had any problems since leaving hospital.

Are there any risks involved with joining the study?

It is not possible to guarantee that any woman will have a normal labour and delivery nor a normal healthy baby. You would receive the same standard of care as is normally given to any woman in labour, whether you were in the water birth group or the land birth group. There is a growing group of midwives who are experienced in caring for women using the pool. These midwives are trained to look out for any early signs of problems affecting you or your baby and would ask you to leave the pool if they felt it was necessary.

There is no evidence that a water birth presents a greater risk to you or your baby than a conventional land birth. Nationally, there have been some unexplained deaths of babies whose mothers have laboured or given birth in water. The other concerns surrounding water births that we would like to obtain information about are:

- The risk of the baby inhaling water immediately after delivery, while still under water
- Whether the fetus (unborn baby) becomes overheated if the woman gets too hot in the pool
- Whether the baby born in water is at greater risk of infection from water contaminated by blood and possibly faeces (bowel contents)
- Whether the umbilical cord is more likely to tear due to the warm water temperature
- whether the baby is at greater risk of polycythaemia (having too many red blood cells)

Are there any benefits if I join the study?

There would be no special benefits to you personally, nor your baby. The results of the study would be of interest to midwives, obstetricians and other pregnant women and their partners.

Your decision

It is important to understand that there is no obligation to take part in the study. If you choose to take part in the study, but wish to withdraw at a later stage, you do not have to give any explanation and you can be assured that your future care will not be affected in any way.

If you decide not to take part in the study you do not have to give a reason and your care will not be affected in any way.

All information obtained in the study would be treated with the utmost confidence. No one would be able to identify you, or your baby, from any written reports concerning the study.

If you are randomised to use the birthing pool it is not possible to guarantee that it will be available when you need it.

Your Midwife would be notified of your participation in the study.

Thank you for taking time to consider the study. If you have any questions or would like to know more about the study please ask the midwife discussing the study with you, or your own midwife. You may wish to discuss the trial with family or friends before deciding whether or not to participate in the study.

The midwife in charge of the study Joanne Woodward can be contacted in the Research and Development Centre on the telephone number [redacted] between the hours of 9am – 5pm.

Appendix 4.: The Waterbirth Study Manual

THE PILOT STUDY FOR A RANDOMISED CONTROLLED TRIAL TO COMPARE THE EFFECT ON THE BABY OF DELIVERY IN WATER OR ON LAND

Study Manual

If help is required to help care for a woman on the study or to collect samples, there is a list of midwives who are happy to be called at any time of the day. The list can be found at the Labour Ward Station, or call Joanne Woodward for advice.

On Admission

All women, whether in the Randomised Controlled Trial or the 'Preference Arm' are allocated to either a waterbirth or a land birth.

Please check whether the woman is allocated to water or to a land birth: the allocation is written on the front of the woman's notes.

If the woman is allocated to:

- Water please follow the instructions in Section 1.
- Land please follow the instructions in Section 2.

These Sections will guide you while you care for women who are participating in the study.

Section 3: provides information about using the Stop watch.

Section 4: provides greater information about obtaining the cord blood samples.

SECTION 1: WATERBIRTH ARM

ALL SAMPLES AND INFORMATION MUST BE COLLECTED EVEN IF THIS WOMAN IS NO LONGER ELIGIBLE FOR THE POOL.

Admission in labour

Please check again to confirm the woman is allocated a waterbirth.

If land birth see LAND BIRTH INSTRUCTIONS IN SECTION 2.

If water birth: recheck eligibility for pool use – if NOT eligible follow instructions for land birth (**all relevant information and samples still need to be collected)**

Please obtain the woman's study envelope from the Waterbirth Study box. This envelope contains all the paperwork and sample containers you will need (pool water bottles x 2, microbiology swabs x 3, 3 syringes, 3 needles, 1 paediatric full blood count bottle).

- The date and time will need to be entered on the sample bottles when collected
- The date and time will need to be entered on the pathology forms when collected
- Baby's name, and date of birth, date and time samples are collected will need to be entered on the microbiology swab form (only one is needed for the three samples)
- the sample bottles will need to be labelled.

If any paperwork or containers are missing, spares should be available in The Pilot Study Equipment Box

Before Pool Use

Before the woman enters the pool take a sample of pool water from the centre of the pool using a clean jug – transfer the water to the sample bottles ensuring that the bottle is full.

Data to be Collected In Labour

1 hourly temperature – thermometer in Pilot Study Equipment Box
½ hourly pulse
1 hourly B.P.
Intermittent fetal heart monitoring as per Trust guideline
1 hourly temperature of pool
Check pool water for signs of faecal contents – record time first noticed in notes
Please record time mother enters the pool. If she gets in and out of the pool please try to record accurately the times she leaves and re-enters the pool. This will enable us to work out exactly the length of time in the pool.
Ensure two pre-heparinised syringes are ready to obtain cord blood. Use only a small amount of heparin and expel as much as possible from syringe and needle

Please record all with accurate times in the notes

When second stage is near:

Prepare the syringes for the cord blood samples – heparin multi-dose vial available in fridge – identify which syringe is for artery and which for vein by the label.

Check stop watch is working and set at zero – instructions for use in Section 3.

Check timer is working – set Timer 1 for 5 minute Apgar but do not start it until the birth (see Section 3.)

At Delivery

Check the stop watch is set at zero prior to delivery of baby – instructions in Section 3.

Start stop watch as soon as baby is delivered (as soon as the feet are delivered – baby will still be under the water) by pressing S1 and at the same time set the Lincoln timer for 5 minute Apgar by pressing the start button.

Stop watch at time of first breath by pressing S2– record this time in notes (stop watch will not retain this once restarted)

Restart watch to time 60 second Apgar by pressing S2

Assess the score and then set Timer 2 on the Lincoln timer to assess the ten minute Apgar – you will need to deduct the time already passed since the birth (ie. may need to set Timer 2 for 7 minutes not 10)

Assess 5 minute Apgar score and 10 minute score

Third Stage of Labour

If active management – double clamp the cord as soon as possible. The best method of obtaining blood is to place baby cord clamp, then artery forcep a short distance away, leave at least 10cm of cord then another artery forcep and then another cord clamp to clamp the end of the cord. Then cut the 10cm of cord off between the two forceps and the cord clamps. The blood can then be obtained straight away and taken to Gosset for pH etc. and a small amount in the paediatric full blood count bottle. (see instructions below)

If physiological third stage please note the time the cord is double clamped and cut.

Please describe the method of managing the third stage accurately in the notes and record the time of double clamping of cord accurately and delivery of placenta accurately

Cord Blood Samples

Obtain the insulated travel cool bag from the waterbirth study box and the travel ice pack from the labour ward fridge ice box

Collect in prepared heparinised syringes ensuring the correct one is used for each sample.

Obtain first sample from cord artery (these are the two small thin vessels) for full blood count and blood gas analysis.

Once obtained, place some in the paediatric full blood count bottle between the two marks – move the blood up and down the bottle gently a few times.

Leave some arterial blood (minimum 0.3ml) in the syringe for gas analysis.

Please place the syringe containing blood for the gas analysis in the small travel cool bag with the travel ice pack.

Obtain blood from cord vein (large vessel – much easier to obtain blood) - for blood gas analysis. Place this syringe in the travel cool bag.

Please record exact time obtained in the notes and then take samples for blood gas analysis to Gosset Ward. Please inform the staff that they are Water Birth Study samples.

Label the results to say which is artery and which is the venous result. Attach the results to the check list and place in the large envelope that the specimen containers etc have been in. Replace in the equipment study box.

When Mother Leaves Pool

Record exact time mother leaves the pool in notes.
Obtain water sample from centre of the pool using a jug. Ensure that the bottle is full again. Write the date and time on the bottle and microbiology form.

Before Baby is Dressed

Record rectal temperature – record exact time taken
Obtain swabs from umbilicus, ear and mouth. The mouth and ear swabs are to be obtained as soon as possible after the birth. The umbilical swab is to be obtained as soon as the baby leaves the pool.
Record exactly the time of the first feed, method and length of feed/amount of feed

Before Mother Leaves Labour Ward

Give Labour Ward Questionnaire for her to complete together with the envelope. Ask the mother to seal the questionnaire in envelope. Please place in Pilot Study Equipment Box

Complete check list and make any comments as to difficulty in obtaining samples or problems that occur. Leave in Pilot Study Equipment Box in the woman's large envelope.

The baby swabs, cord full blood count and water samples are sent to pathology in the normal way.

Thank you for your help

SECTION 2. LAND BIRTH ARM

Admission in labour

Please check whether woman is allocated a water or land birth

If water birth see WATER BIRTH INSTRUCTIONS.

These instructions are also for women who are no longer eligible for a water birth

ALL SAMPLES AND INFORMATION MUST BE COLLECTED EVEN IF THIS WOMAN IS NO LONGER ELIGIBLE TO USE THE POOL UNLESS SHE WITHDRAWS HER CONSENT FOR THE STUDY

Please obtain the woman's study envelope from the Waterbirth Study box. This envelope contains all the paperwork and sample containers you will need.

- The date and time will need to be entered on the sample bottles when collected
- The date and time will need to be entered on the pathology forms when collected
- Baby's name, and date of birth, date and time samples are collected will need to be entered on the microbiology swab form (only one is needed for the three samples)
- the sample bottles will need to be labelled.

If any paperwork or containers are missing, spares should be available in The Pilot Study Equipment Box

Data to be Collected In Labour

1 hourly temperature – thermometer in Pilot Study Equipment Box
½ hourly pulse
1 hourly B.P.
Intermittent fetal heart monitoring as per Trust guideline

Ensure two pre-heparinised syringes are ready to obtain cord blood. Use only a small amount of heparin and expel as much as possible from syringe and needle

Please record all with accurate times in the notes

When second stage is near:

Prepare the syringes for the cord blood samples – heparin multi-dose vial available in fridge – identify which syringe is for artery and which for vein by the label.

Check stop watch is working and set at zero – instructions for use in Section 3.

Check timer is working – set Timer 1 for 5 minute Apgar but do not start it until the birth (see Section 3.)

At Delivery

Check the stop watch is set at zero prior to delivery of baby – instructions in Section 3.

Start stop watch as soon as baby is delivered (as soon as the feet are delivered) by pressing S1 and at the same time set the Lincoln timer for 5 minute Apgar by pressing the start button.

Stop watch at time of first breath by pressing S2– record this time in notes (stop watch will not retain this once restarted)

Restart watch to time 60 second Apgar by pressing S2

Assess the score and then set Timer 2 on the Lincoln timer to assess the ten minute Apgar – you will need to deduct the time already passed since the birth (ie. may need to set Timer 2 for 7 minutes not 10)

Assess 5 minute Apgar score and 10 minute score

Third Stage of Labour

If active management – double clamp the cord as soon as possible. The best method of obtaining blood is to place baby cord clamp, then artery forcep a short distance away, leave at least 10cm of cord then another artery forcep and then another cord clamp to clamp the end of the cord. Then cut the 10cm of cord off between the two forceps and the cord clamps. The blood can then be obtained straight away and taken to Gosset for pH etc. and a small amount in the paediatric full blood count bottle. (see instructions below)

If physiological third stage please note the time the cord is double clamped and cut.

Please describe the method of managing the third stage accurately in the notes and record the time of double clamping of cord accurately and delivery of placenta accurately

Cord Blood Samples

Obtain the insulated travel cool bag from the waterbirth study box and the travel ice pack from the labour ward fridge ice box

Collect in prepared heparinised syringes ensuring the correct one is used for each sample.

Obtain first sample from cord artery (these are the two small thin vessels) for full blood count and blood gas analysis.

Once obtained, place some in the paediatric full blood count bottle between the two marks – move the blood up and down the bottle gently a few times.
Leave some arterial blood (minimum 0.3ml) in the syringe for gas analysis.

Please place the syringe containing blood for the gas analysis in the small travel cool bag with the travel ice pack.

Obtain blood from cord vein (large vessel – much easier to obtain blood) - for blood gas analysis. Place this syringe in the travel cool bag.

Please record exact time obtained in the notes and then take samples for blood gas analysis to Gosset Ward. Please inform the staff that they are Water Birth Study samples.

Label the results to say which is artery and which is the venous result. Attach the results to the check list and place in the large envelope that the specimen containers etc have been in. Replace in the equipment study box.

Before Baby is Dressed

Record rectal temperature – record exact time taken
Obtain swabs from umbilicus, ear and mouth. The swabs are to be obtained as soon as possible after the birth.
Record exactly the time of the first feed, method and length of feed/amount of feed

Before Mother Leaves Labour Ward

Give Labour Ward Questionnaire for her to complete together with the envelope. Ask the mother to seal the questionnaire in envelope. Please place in Pilot Study Equipment Box

Complete check list and make any comments as to difficulty in obtaining samples or problems that occur. Leave in Pilot Study Equipment Box in the woman's large envelope.

The baby swabs, cord full blood count and water samples are sent to pathology in the normal way.

Thank you for your help

SECTION 3: HOW TO USE THE STOP WATCH

Stop Watch to Time First Breath

Before the Birth

Ensure that the stop watch is set at zero.

At Birth: when the feet are delivered (baby will still be under water if a waterbirth)

Press S1 at birth (when baby's feet are delivered) to start timer to time first breath in seconds after the birth.

Press S2 at first breath. Write down the time in seconds (stop watch will not keep this once restarted).

Time 1 minute Apgar

Press S2 to restart the timer for 60 seconds count down for one minute Apgar score.

Press S1 to stop the watch.

Once the Apgar scores have been assessed reset the stop watch to zero for next person by pressing S2.

Thank You.

Please report any problems with the stop watch to Joanne Woodward. There is a spare battery in the waterbirth equipment box.

SECTION 4: OBTAINING CORD BLOODS

EQUIPMENT

2 or 3 syringes
2 or 3 needles
Travel ice pack from ice box in drug fridge
Heparin – multidose vial from drug fridge (labelled as waterbirth study)
Paediatric full blood count bottle
Extra cord clamp
Silver travel cool bag in the waterbirth equipment box

JUST BEFORE DELIVERY IF POSSIBLE

Pre-heparinise the syringes by drawing up a small amount of heparin and pull the plunger up and down a few times. Expel the heparin back into the vial. Then get as much of the excess heparin out of the syringe and needle as possible by pumping the plunger backwards and forwards. Heparin is acid so will affect the pH result.

THIRD STAGE OF LABOUR

Active management (the preferred method for samples):
double clamp the cord leaving at least 10 cm. between the two forceps. A good method is to place baby's cord clamp on, then the two forceps with the minimum of 10cm between them and then place another baby cord clamp at the end of the cord that will be remaining with the placenta.

Please record the time when the cord is clamped.

Then cut the 10cm of cord off between the two baby cord clamps and the forceps.

Physiologically managed (may be more difficult to get blood and samples may not be accurate. If woman requests fine):
please record carefully on the check list that third stage was physiologically managed. As soon as possible double clamp a

minimum of 10cm of cord. Again remove this 10cm of cord as soon as appropriate.

OBTAINING BLOODS

The blood can be left in the umbilical cord up to 60 minutes after the birth without affecting the gas analysis. If a home birth, please transport the placenta and umbilical cord intact and obtain samples when in the hospital within 60 minutes.

Get the **arterial blood** first (the 2 thin vessels).

- get minimum of 0.3ml to take to Gosset for blood gas analysis in the syringe with the needle left on. Place the syringe with the needle on in the silver cool bag with the travel ice pack.
- get some more for the full blood count – you may wish to use the third syringe and needle for this.
- How to fill the full blood count bottle – when blood is in syringe take off the needle, take off the top from the bottle and place blood into the bottle. Place the top back on and then **gently** shake the bottle a few times to move the blood up and down the bottle this should prevent it from clotting.
- If you are unable to get a second lot of arterial blood for the full blood count use venous blood but please state on the pathology form and check list

GET VENOUS BLOOD

This is the large vessel. Obtain blood for blood gas analysis on Gosset and if unable to obtain arterial blood for the full blood count obtain extra for that.

Please take sample of arterial and venous blood to Gosset for analysis as soon as possible. Place the syringe and needle in the silver cool bag with the ice pack

GOSSET WARD

Inform them that these are Water Birth Study samples
Get the arterial sample analysed first

Mark the results slip stating whether arterial or venous sample and place these in the large envelope that the containers were in and replace in the water birth equipment box along with the silver cool bag

Place the ice pack back in the fridge ice box and the silver cool bag in the waterbirth equipment box.

Thank you

Appendix 5.: Waterbirth Study Data Collection Check List: Waterbirth

The Pilot Study for a Randomised Controlled Trial to Compare the Effect on the Baby of Delivery in Water or on Land

Please complete this before the woman leaves labour ward. If you have any problems obtaining, or are unable to obtain any samples, please explain why in the comments box**. Please try very hard to obtain the data required. If data are not collected it is likely to lessen the worth of the study results.**

Check List Study Number.....

Water Birth Allocation	**Yes**	**No**	**Any Comments**
Is this woman still eligible to use the pool?			.....
Have you obtained pool water sample before use of pool?			.....
Have you obtained pool sample when woman left the pool?			.....
Have you recorded maternal temperature hourly in notes?			.....
Have you recorded maternal pulse in notes?			.....
Have you recorded maternal B.P. in notes?			.....
Have you recorded fetal heart rate in notes?			.....
Have you recorded pool temperature in notes?			.....
Have you recorded the time whenever mother entered and left the pool in the notes?			.....
Have you recorded time faecal contents seen in pool?			.....
Time of baby's first breath .....seconds			
Have you recorded 1 minute Apgar score?			.....
Have you recorded 5 minute Apgar score?			.....
Have you recorded 10 minute Apgar score?			.....

Was third stage physiologically managed or actively managed? (please circle as appropriate)

	Yes	No	Comments
Did the cord tear?			.....
Have you recorded time cord double clamped?			.....
Have you recorded time cord bloods obtained?			.....
Have you obtained cord arterial blood for full blood count?			.....
Have you obtained cord arterial blood for pH etc.?			.....
Have you obtained cord venous blood for pH etc?			.....
Have blood gas results performed in Gosset been attached to this check list?			.....
Have you obtai;ned mouth, ear and umbilical swabs from baby			.....
Have you recorded baby's rectal temperature & time taken?			.....
Have you recorded time and length/amount of baby's first feed?			.....
Have you given mother Labour Ward Questionnaire to complete?			.....
Has questionnaire been sealed in envelope and placed in box?			.....

Thank you for your help. If there have been any problems obtaining the samples, or they have not obtained, please explain why in the comments column.

Appendix 6.: Waterbirth Study Data Collection Check List: Land Birth

The Pilot Study for a Randomised Controlled Trial to Compare the Effect on the Baby of Delivery in Water or on Land

Please complete this before the woman leaves labour ward. If you have any problems obtaining, or are unable to obtain any samples, please explain why in the comments box**. Please try very hard to obtain the data required. If data are not collected it is likely to lessen the worth of the study results.**

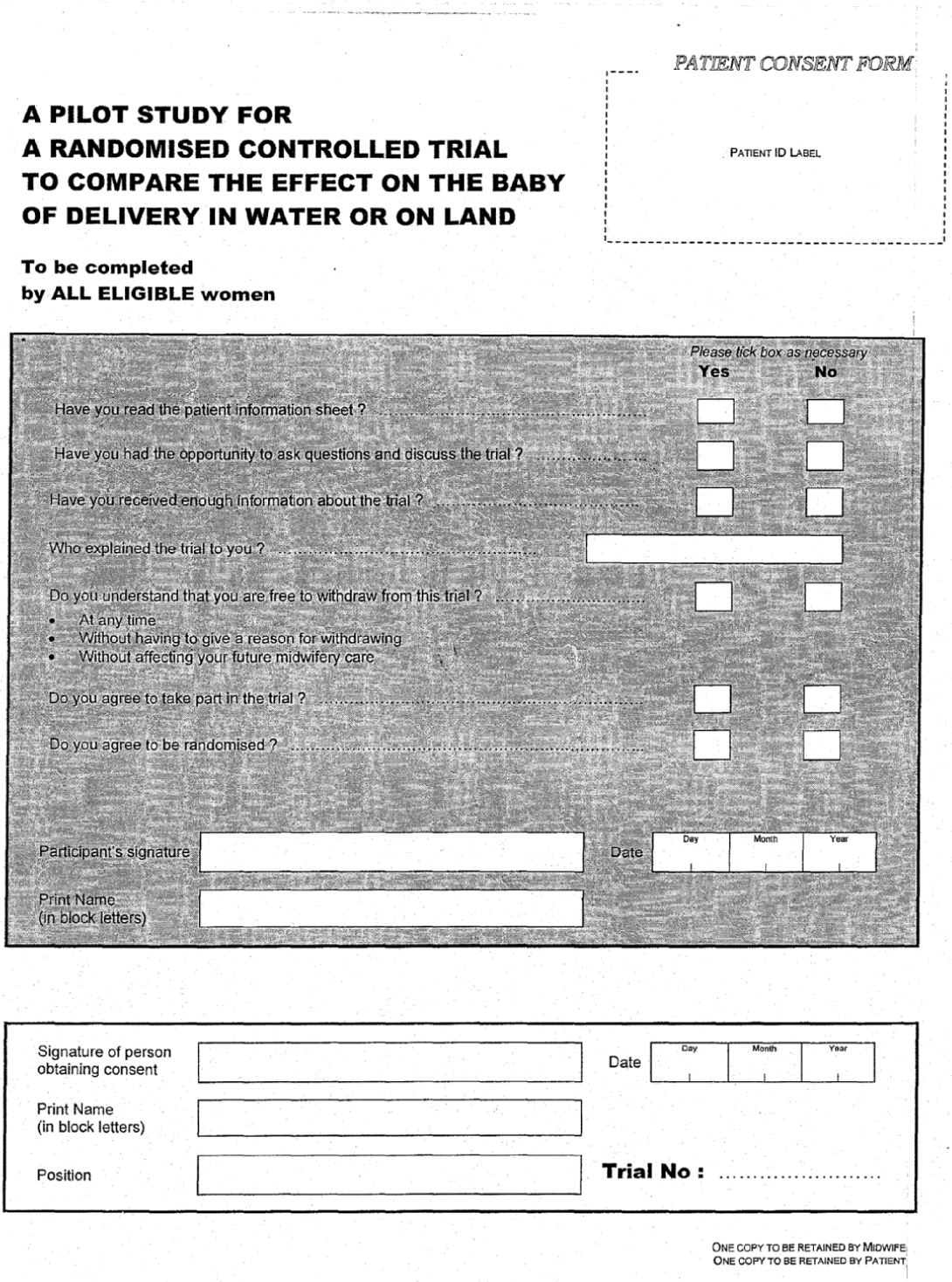
Check List Study Number.....

Land Birth Allocation	**Yes**	**No**	**Any Comments**
Have you recorded maternal temperature hourly in notes?			.....
Have you recorded maternal pulse in notes?			.....
Have you recorded maternal B.P. in notes?			.....
Have you recorded fetal heart rate in notes?			.....
Time of baby's first breath .....seconds			
Have you recorded 1 minute Apgar score?			.....
Have you recorded 5 minute Apgar score?			.....
Have you recorded 10 minute Apgar score?			.....
Was third stage physiologically managed or actively managed? (please circle as appropriate)			
Did the cord tear?			.....
Have you recorded time cord double clamped?			.....
Have you recorded time cord bloods obtained?			.....
Have you obtained cord arterial blood for full blood count?			.....
Have you obtained cord arterial blood for pH etc.?			.....

	Yes	No	Comments
Have you obtained cord venous blood for pH etc?			.....
Have blood gas results performed in Gosset been attached to this list?			……
Have you obtained mouth, ear and umbilical swabs from baby?			.....
Have you recorded baby's rectal temperature & time taken?			.....
Have you recorded time and length/amount of baby's first feed?			.....
Have you given mother Labour Ward Questionnaire to complete?			.....
Has questionnaire been sealed in envelope and placed in box?			.....

Thank you for your help. If there have been any problems obtaining the samples, or they have not obtained, please explain why in the comments column.

Appendix 7.: Waterbirth Study Consent Form: Randomised Arm



PATIENT CONSENT FORM

A PILOT STUDY FOR
A RANDOMISED CONTROLLED TRIAL
TO COMPARE THE EFFECT ON THE BABY
OF DELIVERY IN WATER OR ON LAND

PATIENT ID LABEL

To be completed
by ALL ELIGIBLE women

Please tick box as necessary

	Yes	No
Have you read the patient information sheet ?	☐	☐
Have you had the opportunity to ask questions and discuss the trial ?	☐	☐
Have you received enough information about the trial ?	☐	☐
Who explained the trial to you ?		
Do you understand that you are free to withdraw from this trial ? • At any time • Without having to give a reason for withdrawing • Without affecting your future midwifery care	☐	☐
Do you agree to take part in the trial ?	☐	☐
Do you agree to be randomised ?	☐	☐

Participant's signature _____ Date Day ___ Month ___ Year ___

Print Name (in block letters) _____

Signature of person obtaining consent _____ Date Day ___ Month ___ Year ___

Print Name (in block letters) _____

Position _____ **Trial No :** .....

ONE COPY TO BE RETAINED BY MIDWIFE
ONE COPY TO BE RETAINED BY PATIENT

Appendix 8.: Waterbirth Study Consent Form: Preference Arm

A PILOT STUDY FOR
A RANDOMISED CONTROLLED TRIAL
TO COMPARE THE EFFECT ON THE BABY
OF DELIVERY IN WATER OR ON LAND

PATIENT ID LABEL

To be completed
by ALL ELIGIBLE women

Please tick box as necessary

	Yes	No
Have you read the patient information sheet ?	☐	☐
Have you had the opportunity to ask questions and discuss the trial ?	☐	☐
Have you received enough information about the trial ?	☐	☐
Who explained the trial to you ?		
Do you understand that you are free to withdraw from this trial ? • At any time • Without having to give a reason for withdrawing • Without affecting your future midwifery care	☐	☐
Do you agree to take part in the trial ?	☐	☐
Do you agree to take part in the 'preference arm' of the trial ?	☐	☐

Please tick your preferred choice

- Water birth ? ☐
- Conventional land birth ? ☐

Participant's signature _____ Date Day ___ Month ___ Year ___

Print Name
(in block letters) _____

Signature of person
obtaining consent _____ Date Day ___ Month ___ Year ___

Print Name
(in block letters) _____

Position _____

Trial No : .....

ONE COPY TO BE RETAINED BY MIDWIFE
ONE COPY TO BE RETAINED BY PATIENT

Appendix 9: Analysis of the Women's Antenatal Questionnaire

The Pilot Study for a Randomised Controlled Trial to Compare the Effect on the Baby of Delivery in Water or on Land

Antenatal Questionnaire

Name: **Study No.** **Date:**

CONFIDENTIAL

Please read each question carefully, and follow the instructions in brackets after each question, before deciding on your answer. For those questions that give a choice of 'Yes', 'No', or 'Don't know' please circle the correct answer.

1. Did you have a choice about where to have your baby?

	RCT ***n* (%)**	**Preference Arm** ***n* (%)**	***P*** **0.08**
Yes	35 (58.3)	16 (80.0)	
No	25 (41.7)	4 (20.0)	

2. Would you prefer to give birth elsewhere?

	RCT ***n* (%)**	**Preference Arm** ***n* (%)**	***P*** **0.33**
Yes	5 (8.3)	0	
No	55 (91.7)	20 (100.0)	

3. **If 'Yes' where?**

	RCT ***n***	**Preference Arm** ***n***
Home	5	0

Why was this not possible?

	RCT ***n* = 5**
Husband did not want a home birth	2
Previous breech birth so was advised against home birth	1
Previous home birth, but had complications and was advised not to have another home birth	1
'More convenient for everyone else if I had a hospital birth'	1

4. When you first realised you were pregnant how did you feel? (please circle the most appropriate word)

	RCT *n* (%)	Preference Arm *n* (%)
Overjoyed	29 (48.3)	13 (65.0)
Not very happy	1 (1.7)	0
Unhappy	0	0
No particular feelings	0	0
Mixed feelings	21 (35.0)	4 (20.0)
Pleased	9 (15.0)	3 (15.0)

5. During your pregnancy would you say that overall you have been: (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
Reasonably cheerful most of the time	51 (85.0)	17 (85.0)
Depressed or low spirited most of the time	0	0
Mood swings from one extreme to the other	9 (15.0)	3 (15.0)
Other (please say what)	0	0

6. During this pregnancy have you attended parentcraft classes?

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.03
Yes	40 (66.7)	8 (40.0)	
No	20 (33.3)	12 (60.0)	

7. If the answer is 'No' please indicate why not by ticking all the reasons that apply:

	RCT *n* = 20 *n* (%) *	Preference Arm *n* = 12 *n* (%) *
I was not offered classes	5 (25.0)	5 (41.7)
I know all I need to know from previous births	7 (35.0)	6 (50.0)
I know all I need to know from books I have read or talking to friends	4 (20.0)	4 (33.3)
It is not convenient for me to attend classes	0	3 (25.0)
There is no point, one cannot learn how to give birth	0	1 (8.3)
I get all the information I need from my ante-natal clinic	0	0
I have attended classes for my previous births and do not need to attend again	13 (65.0)	6 (50.0)
Other	0	1 (8.3)

* May be more than one response per woman

8. When talking to the healthcare professionals you have met while pregnant are you able to discuss the things you want to with them fully? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.25
Always	38 (63.3)	15 (75.0)	
Most of the time	22 (36.7)	5 (25.0)	
Occasionally	0	0	
Never	0	0	

9. When talking to doctors and midwives are you as assertive as you would like to be? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.20
Yes	40 (66.7)	16 (80.0)	
Sometimes I am but sometimes I am not	20 (33.3)	4 (20.0)	
No	0	0	

10. How much do you want to know about what may happen during labour and childbirth? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.19
I'd rather not know anything	0	0	
I want to know just the basics	3 (5.0)	0	
I want to know most things but not things that will upset me	3 (5.0)	0	
I am happy for the staff to decide how much I ought to know	9 (15.0)	2 (10.0)	
I want to know as much as possible	45 (75.0)	18 (90.0)	

11. During this pregnancy do you feel you have been given: (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.69
Too much information	0	0	
The right amount of information	53 (88.3)	17 (85.0)	
Too little information	3 95.0)	2 (10.0)	
Too much about some aspects, too little about others	4 (6.7)	1 (5.0)	

12. Have you written a birth plan so that your wishes about the birth are clear for professionals caring for you?

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.49
Yes	20 (33.3)	5 (25.0)	
No	40 (66.7)	15 (75.0)	

13. If 'Yes' please tick any statement that you agree with. The advantages of writing down what you want are:

	RCT *n* = 20 *n* (%) *	Preference Arm *n* = 5 *n* (%) *
Writing it down helps me sort things out in my head	17 (85.0)	1 (20.0)
I want to help myself, when in labour, to stick to whatever I decided before I went into labour	2 (10.0)	1 (20.0)
When in labour I will not be in a good position to tell staff what I want	8 (40.0)	1 (20.0)
If my wishes are in writing the staff are less likely to carry out procedures I do not want	5 (25.0)	1 (20.0)
The staff attending me in labour will be able to Know what I want from reading the birth plan	16 (80.0)	2 (40.0)

* May be more than one response per woman

14. If you answered 'No' to question 12, please tick any of the following statements you agree with: There is no point in writing down you wishes because:

	RCT *n* = 40 *n* (%)	Preference Arm *n* = 15 *n* (%)
It is not possible to know what one will want during labour in advance	24 (60.0)	9 (60.0)
There is no need as I do want any thing in particular	2 (5.0)	3 (20.0)
I don't think the staff will take notice of it	1 (2.5)	0
I do not like writing things down	0	0
Other	12 (30.0)	4 (26.7)

15. Listed here are some procedures that women may be given in labour. Please circle <u>one</u> of the following responses that fits your feelings about that procedure.

Procedures in Labour	Trial Group	Don't know enough to make a decision	Definitely don't want	Prefer not to have	Don't mind	Would quite like	Definitely do want
a. Fetal heart rate monitoring at intervals							
	RCT	1(2)	1(2)	2(4)	25(42)	12(20)	19(32)
	PA	0	0	1(5)	7(35)	2(10)	5(25)
b. Continuous fetal heart rate monitoring							
	RCT	1(2)	4(7)	22(37)	22(37)	6(10)	4(7)
	PA	0	5(25)	4(20)	6(30)	2(10)	3(15)
c. Episiotomy							
	RCT	4(7)	5(8)	30(50)	21(35)	0	0
	PA	0	4(20)	14(70)	2(10)	0	0
d. Induction of Labour							
	RCT	0	4(7)	34(57)	21(35)	0	0
	PA	1(5)	3(15)	12(60)	2(10)	2(10)	0
e. Acceleration of Labour							
	RCT	5(8)	6(10)	20(33)	25(42)	4(7)	0
	PA	1(5)	3(15)	8(40)	7(35)	1(5)	0

f. Forceps – if you were very tired and the staff suggested a forceps delivery, what do you think you would prefer to do? (assuming that there was no immediate danger to your baby)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.41
I would prefer to accept immediately	8 (13.3)	1 (5.0)	
I would prefer to wait a bit	24 (40.0)	6 (30.0)	
I would prefer to avoid forceps	20 (33.3)	13 (65.0)	
Don't know	8 (13.4)	0	

16. Without drugs would you expect your labour to be: (please tick one box only)

	RCT *n* (%)	Preference Arm *n* (%)
Not at all painful	0	0
Moderately painful	1(1.9)	0
Quite painful	18 (30.0)	4 (20.0)
Very painful	28 (47.0)	12 (60.0)
Unbearably painful	7 (12.0)	2 (10.0)
I have no idea	6 (10.0)	2 (10.0)

17. Are you worried about the thought of pain in labour? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.21
No	13 (21.7)	3 (15.0)	
A bit	41 (70.0)	13 (65.0)	
Very worried	5 (8.3)	4 (20.0)	

18. Which of the options would you prefer ideally? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
The most pain-free labour that drugs can give me	5 (8.0)	3 (15.0)
The minimum amount of drugs to keep the pain manageable	38 (63.0)	11 (55.0)
To put up with a lot of pain to have a drug-free labour	16 (27.0)	5 (25.0)
Other	1 (2.0)	1 (5.0)

19. How do you feel about using each of the following methods of pain relief in labour? (please circle the appropriate answer for you)

Method of pain relief	Trial Group	Don't know enough to make a decision	Definitely don't want	Prefer not to have	Don't mind	Would quite like	Definitely do want
Gas and Air							
	RCT	0	0	3(5)	17(28)	18(30)	22(37)
	PA	0	0	3(15)	4(20)	6(30)	7(35)
Injection of Pethidine/Meptid							
	RCT	3(5)	9(15)	26(43)	15(9)	5(8)	2(3)
	PA	0	4(20)	10(50)	3(15)	3(15)	0
Epidural							
	RCT	0	17(28)	29(48)	11(18)	2(3)	1(2)
	PA	0	9(45)	6(30)	3(15)	1(5)	1(5)

20. Do you intend to use breathing and relaxation exercises in labour? (please circle the appropriate answer)

	RCT *n* (%)	'Preference Arm' *n* (%)	*P* 0.21
Yes definitely	19 (31.7)	5 (25.0)	
Yes probably	28 (46.7)	6 (30.0)	
Don't know	7 (11.7)	8 (40.0)	
Probably not	6 (10.0)	1 (5.0)	
Definitely not	0	0	

21. Are you thinking of using other methods of pain relief eg. massage, yoga, TENS? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.95
No	31 (51.7)	11 (55.0)	
Yes	29 (48.3)	9 (45.0)	

If 'Yes' please say what:

	RCT *n*	Preference Arm *n*
Massage	15	6
TENS	10	5
Yoga	3	1
Aromatherapy	3	2
Reflexology	2	0
Reiki	2	0
Water	1	0
Music	1	0
Walking	1	0

22. How involved do you want midwives and doctors to be in the decisions about the pain relief you might use in labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
I will leave it up to the staff to make the right decision	2 (3.3)	0
I would like the staff to advise me and I will probably take their advice	33 (55.0)	8 (40.0)
I would like the staff to advise me but I will still make up my own mind even in my decision is different from their advice	25 (41.7)	12 (60.0)
I do not want any staff involvement in the decision	0	0

23. Do you <u>want</u> to be looked after during labour by a midwife that you have already met? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.21
Yes I want this very much	9 (15.0)	5 (25.0)	
Yes I would quite like this	18 (30.0)	7 (35.0)	
I don't mind	33 (55.0)	8 (40.0)	
No I would prefer not to have this	0	0	
No I definitely do not want this	0	0	

24. Do you <u>expect</u> to be looked after by a midwife you have already met? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.08
Yes I am sure this will happen	2 (3.0)	3 (15.0)	
Yes I think it will probably happen	1 (1.5)	4 (20.0)	
I don't have any expectations	33 (56.0)	6 (30.0)	
No I think it probably won't happen	21 (36.0)	7 (35.0)	
No I am sure that it won't happen	3 (5.0)	0	

25. Do you <u>want</u> to have the same midwife with you throughout your labour and delivery? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.07
Yes I want this very much	8 (13.3)	6 (30.0)	
Yes I would quite like this	37 (61.7)	11 (55.0)	
I don't mind	15 (25.0)	3 (15.0)	
No I would prefer not to have this	0	0	
No I definitely do not want this	0	0	

26. Do you <u>expect</u> that you will have the same midwife with you throughout your labour and delivery? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.37
Yes I am sure this will happen	2 (3.3)	3 (15.0)	
Yes I think this will probably happen	7 (11.7)	4 (20.0)	
I don't have any expectations	31 (51.7)	6 (30.0)	
No I think it probably won't happen	18 (30.0)	6 (30.0)	
No I am sure that it won't happen	1 (1.7)	1 (5.0)	

27. How important is it to you that you do not have lots of different people coming in and out of the room while you are in labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.45
I definitely do not want lots of people coming in and out	4 (6.7)	5 (25.0)	
I would prefer not to have lots of people coming in and out	35 (58.3)	12 (60.0)	
I don't mind	20 (33.3)	2 (10.0)	
I would quite like lots of people coming in and out	0	1 (5.0)	
I definitely want lots of people coming in and out	0	0	

28. Do you <u>expect</u> that there will be lots of different people coming in and out of the room while you are in labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.37
No I am sure there won't be	5 (8.3)	3 (15.0)	
No I think there probably won't be	19 (31.7)	7 (35.0)	
I don't have any expectations	24 (40.0)	6 (30.0)	
Yes I think there probably will be	12 (20.0)	4 (20.0)	
Yes I think there will be	0	0	

29. Do you <u>want</u> a birth companion (husband/partner/mother/friend) with you throughout labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.41
Yes I want this very much	58 (96.7)	20 (100.0)	
Yes I would quite like this	2 (3.3)	0	
I don't mind	0	0	
No I would prefer not to have this	0	0	
No I definitely do not want this	0	0	

30. Do you <u>expect</u> that you will have a birth companion with you throughout labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.61
Yes I am sure that this will happen	56 (93.3)	19 (95.0)	
Yes I think it probably will happen	3 (5.0)	1 (5.0)	
I don't have any expectations	1 (1.7)	0	
No I think it probably won't happen	0	0	
No I am sure that it won't happen	0	0	

31. If there are no complications while you are in labour who do you <u>think</u> should make most of the decisions? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.013
Staff should just get on with it, that is their job	1 (1.7)	0	
Staff should make the decisions but I would like to be kept informed	15 (25.0)	2 (10.0)	
Staff should discuss things with me before reaching their decision	22 (36.7)	6 (30.0)	
Staff should give their assessment of the situation but I should be the one in control	20 (33.3)	12 (60.0)	
I should make the decision, staff should do what I tell them	0	1 (5.0)	
I don't mind	2 (3.3)	0	

32. If there are no complications who would you <u>expect</u> will make most of the decisions about your labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.72
I expect the staff will just get on with it	1 (1.7)	0	
I expect the staff will make the decisions but keep me informed	15 (25.0)	2 (10.0)	
I expect the staff will discuss things with me before reaching a decision	16 (26.6)	8 (40.0)	
I expect staff will give me their assessment but I will be the one in control of the decision	25 (41.7)	9 (45.0)	
I expect to make the decision, staff should do what I tell them	0	1 (5.0)	
I don't have expectations	3 (5.0)	0	

33. In an emergency who do you <u>think</u> should make the decisions? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.01
Staff should just get on with it, that is their job	6 (10.0)	0	
Staff should make the decisions but I would like to be kept informed	38 (63.4)	9 (45.0)	
Staff should discuss things with me before reaching their decision	14 (23.3)	11 (55.0)	
Staff should give me their assessment of the situation but I should be the one in control of the decision	0	0	
I should make the decision, staff should do what I tell them	0	0	
I don't mind	2 (3.3)	0	

34. In an emergency who do you <u>expect</u> will make the decisions? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.02
I expect the staff will just get on with it	9 (15.0)	1 (5.0)	
I expect the staff will make the decisions but keep me informed	42 (70.0)	11 (55.0)	
I expect the staff will discuss things with me before they reach a decision	8 (13.3)	8 (40.0)	
I expect staff will give me their assessment but I will still be the one in control of the decision	0	0	
I expect to make the decision, staff should do what I tell them	0	0	
I don't have any expectations	1 (1.7)	0	

35. Do you <u>want</u> to be in control of what midwives/doctors do to you during your labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.44
Yes I want this very much	10 (16.7)	11 (55.0)	
Yes I would quite like this	39 (65.0)	9 (45.0)	
I don't mind	10 (16.7)	0	
No I would prefer not to be	1 (1.7)	0	
No I definitely do not want to be	0	0	

36. Do you <u>expect</u> to be in control of what midwives/doctors do to you during labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.51
Yes I am sure I will be	3 (5.0)	2 (10.0)	
Yes I think I probably will be	34 (56.7)	11 (55.0)	
I don't have any expectations	20 (33.3)	4 (20.0)	
No I think I probably won't be	2 (3.3)	3 (15.0)	
No I am sure I won't be	1 (1.7)	0	

37. How important is it to you <u>not</u> to lose control of the way you behave during labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.19
Very important	10 (16.7)	8 (40.0)	
Quite important	34 (56.7)	6 (30.0)	
Not very important	14 (23.3)	6 (30.0)	
Not at all important	2 (3.3)	0	

38. Do you expect that you <u>will</u> lose control of the way you behave during labour? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.81
I am sure that I will	3 (5.0)	1 (5.0)	
I think I probably will	15 (25.0)	5 (25.0)	
I don't have any expectations	25 (41.7)	8 (40.0)	
I think I probably will not	16 (26.7)	4 (20.0)	
I am sure that I won't	1 (1.7)	2 (10.0)	

39. How important is it to you to feel in control during contractions (eg. you are aware of what is going on around you during your contractions)? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.89
Very important	17 (28.3)	5 (25.0)	
Quite important	36 (60.0)	13 (65.0)	
Not very important	7 (11.7)	2 (10.0)	
Not at all important	0	0	

40. Do you <u>expect</u> that you will feel in control during contractions (eg. you are aware of what is going on around you during your contractions)? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.15
I am sure that I will	2 (3.3)	0	
I think I probably will	33 (55.0)	9 (45.0)	
I don't have any expectations	21 (35.0)	7 (35.0)	
I think I probably will not	4 (6.7)	4 (20.0)	
I am sure that I won't	0	0	

41. How important is it to you that giving birth will be a fulfilling experience? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*p* 0.89
Very important	24 (40.0)	7 (35.0)	
Quite important	27 (45.0)	11 (55.0)	
Not very important	8 (13.3)	1 (5.0)	
Not at all important	1 (1.7)	1 (5.0)	
I don't know what this means	0	0	

42. Do you <u>expect</u> that giving birth will be a fulfilling experience? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.86
Yes I am sure that it will be	21 (35.0)	7 (35.0)	
Yes I think it probably will be	26 (43.3)	8 (40.0)	
I don't have any expectations	11 (18.4)	4 (20.0)	
No I think it probably won't be	2 (3.3)	1 (5.0)	
No I am sure that it won't be	0	0	

43. If you have any previous experiences that have influenced your hopes and expectations of this labour, please could you tell us about them below.

Comment Categories	RCT Arm	'Preference Arm'*
Previous negative childbirth experience	5	0
Previous enjoyable experience	2	2
Hearing of other women's experiences	2	0
Expectations following parentcraft classes	3	0
Want drug free labour	1	3
Staffing - hope to be delivered by community midwife	0	1

* more than one response per woman

Thank you for completing this questionnaire. Please seal it in the envelope provided.

If there are any questions or worries that you have after filling in this questionnaire please discuss them with the midwife when you return the questionnaire or contact Joanne Woodward at the Research & Development Centre on telephone number .

Appendix 10: Healthcare Professional Letter: Waterbirth Study

Date

Name
Midwife/Doctor/Consultant
Address

Dear

Re: Woman's Name, Address, Hospital Number, Expected date of delivery

Midwives at the Barratt Maternity Home are undertaking a research project comparing the effects of a water birth compared with a land birth entitled 'The Pilot Study For A Randomised Controlled Trial To Assess The Baby Having A Water Birth Compared With The Baby Having A Land Birth'. If the pilot study is successful the aim is to try and obtain funding to invite other maternity units to recruit women.

Women are recruited from 36 weeks gestation and randomised at a ratio of 2 water births : 1 land birth. To gain information from women who definitely want a water birth, or definitely do not want a water birth, there will be a 'preference arm' to the trial. The aim is to randomise 60 women, have 10 women who definitely want a water birth and 10 women who definitely do not want a water birth. That will make a total of 80 women.

The women will complete a questionnaire at randomisation to look at their expectations for the birthing experience, one on labour ward after the birth and a third questionnaire six weeks after the birth to obtain information concerning their satisfaction with the birth. We will also be asking how the baby is progressing when he/she is six weeks old.

Mrs/Miss/Ms Name is eligible to use the birthing pool and has decided to take part in the study. She has been randomised to a water birth/land birth. An information leaflet is enclosed to explain the study in further detail. If you have any queries concerning the study please contact Joanne Woodward at the Research & Development Centre on telephone number [redacted] between the hours of 0900-1700 hours Monday – Friday.

Yours sincerely,

Joanne Woodward
Research Midwife

Enc.

Appendix 11.: Labour Ward Questionnaire

The Pilot Study For A Randomised Controlled Trial To Assess The Baby Having A Water Birth Compared With The Baby Having A Land Birth

Labour Ward Questionnaire

CONFIDENTIAL

Name: …….. **Study Number:** ……. **Date:** ……

1. How many minutes since the birth of your baby?

…….. minutes

2. On a scale of 0-6, with 0 being 'Not at all satisfied' and 6 being 'Extremely satisfied' please circle the appropriate answer for you describing your satisfaction with your birthing experience.

0 1 2 3 4 5 6

Thank you for completing this questionnaire. Please seal it in the envelope provided.

If you wish to discuss your labour, please ask the midwife you return this questionnaire to.

Appendix 12: Analysis of the Women's 6 week postnatal questionnaire

The Pilot Study for a Randomised Controlled Trial to Compare the Effect on the Baby of Delivery in Water or on Land

Postnatal Questionnaire

Name: **Study No.** **Date:**

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1. Approximately how long was your labour?

	RCT Mean [SD]	**Preference Arm Mean [SD]**	***P*** **0.76**
Length of Labour (Hours)	9.8 [7.53]	10.0 [7.03]	

2. Did you have a birth plan written down in advance about your wishes in labour?

	RCT ***n*** **(%)**	**Preference Arm** ***n*** **(%)**	***P*** **0.75**
Yes	20 (33.8)	6 (30.0)	
No	39 (66.2)	14 (70.0)	

3. If 'Yes' do you feel this was useful? (please circle one answer)

	RCT ***n*** **(%)**	**Preference Arm** ***n*** **(%)**
Yes, it was	13	2
No, it was unhelpful	2	0
It was not particularly helpful or unhelpful	5	3

4. What did you find were the advantages and the disadvantages of having wishes written down?

One woman said she saw no advantages or disadvantages of writing a birth plan. The other women's responses are below.

Advantages:

	RCT ***n*** **(%)**	**Preference Arm** ***n*** **(%)**
Staff knew my wishes	9 (15.3)	0
Gave me more confidence and felt in control	2 (3.4)	0
Birthing Partner knew my wishes	2 (3.4)	0

Disadvantages:

	RCT *n* (%)	Preference Arm *n* (%)
Was not followed	2 (3.4)	2 (10)
Labour event meant it was irrelevant	4 (6.8)	2 (10)
Staff did not seem to take interest/read it	1 (1.7)	1 (5)

5. Was the pain in labour exactly as you expected it? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)
No, not at all	14 (23.7)	4 (20.0)
Yes, in some ways but not in others	32 (54.0)	11 (55.0)
Yes, exactly	12 (20.4)	5 (25.0)
Not applicable	1 (1.7)	0

6. If the pain was not exactly as you expected how did it differ from your expectations? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.13
Much more painful	11 (18.6)	5 (25.0)	
More painful	20 (33.9)	6 (30.0)	
Unsure	2 (3.4)	2 (10.0)	
Less painful	9 (15.3)	2 (10.0)	
Much less painful	2 (3.4)	0	

7. How was the decision about which choice of pain relief to use made? (tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
The staff were insistent that I take their advice and I didn't feel I could refuse	2 (3.4)	2 (10.0)
I was happy to follow the advice of staff on the matter	27 (45.8)	5 (25.0)
I made my own decision with the approval of staff	27 (45.8)	7 (35.0)
I made my own decision against the advice of staff	1 (1.7)	1 (5.0)
I had the pain relief without a decision really being made	1 (1.7)	1 (5.0)
Other (please state)	1 (1.7)	4 (20.0)

8. Looking back, how did you feel about the method(s) of pain relief you used? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
I am very pleased with it	32 (54.2)	8 (40.0)
I am fairly pleased with it	13 (22.0)	6 (30.0)
I am quite unhappy about it	5 (8.5)	3 (15.0)
I am very unhappy about it	2 (3.4)	1 (5.0)
I have no particular feeling about it	3 (5.1)	1 (5.0)
Other (please state)	4 (6.8)	1 (5.0)

9. Did you use breathing and relaxation exercises during labour? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.32
Yes, all the time	10 (17.0)	5 (25.0)	
Yes, most of the time	24 (40.7)	4 (20.0)	
Only for a bit	15 (25.3)	3 (15.0)	
No	10 (17.0)	7 (35.0)	

10. If you used breathing and relaxation exercises how useful did you find them? (please tick one box)

	RCT n = 48 *n* (%)	Preference Arm n = 12 *n* (%)	*P* 0.95
They allowed me to control the pain completely	2 (4.2)	2 (16.7)	
They were helpful in controlling pain	27 (56.3)	4 (33.3)	
They only helped a bit	18 (35.5)	6 (50.0)	
They did not help at all	1 (2.0)	0	

11. Did you use gas and air (entonox)?

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.19
No	10 (16.9)	5 (20.0)	
Not sure	0	0	
Yes	49 (83.1)	15 (75.0)	

If 'Yes' – how effective was it in relieving the pain?

	RCT *n* = 49 *n* (%)	Preference Arm *n* = 15 *n* (%)	*P* 0.06
Very	26 (53.0)	4 (26.7)	
Slightly	19 (38.8)	9 (60.0)	
Not at all	4 (8.2)	2 (13.3)	

12. Did you feel under pressure from midwives to use gas and air? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
Yes, a lot	1 (1.7)	1 (5.0)
Yes, a bit	2 (3.4)	0
Unsure	0	0
No	28 (47.5)	11 (55.0)
No, not at all	26 (44.0)	7 (35.0)
No response	2 (3.4)	1 (5.0)

13. How do you feel now about having had, or not having had gas and air? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
I am pleased about it	44 (74.6)	10 (50.0)
I have mixed feelings about it	3 (5.1)	1(5.0)
I am quite unhappy about it	2 (3.4)	2 (10.0)
I have no particular feelings about it	7 (11.8)	5 (25.0)
Other (please state)	2 (3.4)	1 (5.0)
No response	1 (1.7)	1 (5.0)

14. Did you use water as a method of pain relief? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.15
No	32 (54.2)	13 (65.0)	
Unsure	0	1 (5.0)	
Yes	27 (45.8)	6 (30.0)	

If 'Yes' how effective was it in relieving the pain?

	RCT *n* = 27 *n* (%)	Preference Arm *n* = 6 *n* (%)	*P* 0.15
Very	13 (48.1)	5 (83.3)	
Slightly	13 (48.1)	1 (16.7)	
Not at all	1 (3.8)	0	

15. Did you feel under pressure to use water? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)
Yes, a lot	0	0
Yes, a bit	3 (5.1)	0
Unsure	1 (1.7)	0
No	21 (35.5)	9 (45.0)
No, not at all	31 (52.6)	6 (30.0)
No response	3 (5.1)	5 (25.0)

16. How do you feel now about having had, or not having had, water as a method of pain relief? (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)
I am pleased about it	22 (37.2)	9 (45.0)
I have mixed feelings about it	13 (22.2)	0
I am quite unhappy about it	2 (3.4)	2 (10.0)
I have no particular feelings about it	10 (16.8)	1 (5.0)
Other	6 (10.2)	2 (10.0)
No response	6 (10.2)	0

17. If you were randomised to a waterbirth or definitely wanted a waterbirth and you did not achieve this please explain why you did not have a waterbirth.

	RCT *n*	Preference Arm *n*
Unsure why I couldn't use pool	2	0
Long labour	5	0
Meconium stained liquor	4	1
Midwifery problem		
Short of staff	2	1
No waterbirth qualified staff	2	0
Labour too quick/pool took long time to fill	3	0
Pre-labour rupture of membranes needed induction of labour	2	0
Did not relieve the pain	2	0
Pool occupied	2	0
Complications in labour	1	2
Advised risk of infection by medical staff	2	0
Breech	0	1
Left pool did not want to return	1	0
Too scared to use pool when in labour	1	0
Required induction of labour	2	0
Pyrexial in labour & advised epidural	1	0

18. If you used the birthing pool but had to, or decided to leave it, would you try water as a method of pain relief again in the future? (please circle one answer)

	RCT *n* = 20 *n* (%)	Preference Arm *n* = 2 *n* (%)
Yes	18 (90.0)	2 (100.0)
Unsure	1 (5.0)	0
No	1 (5.0)	0

19. If you had a waterbirth would you have this method of delivery again?

	RCT *n* = 21 *n* (%)	Preference Arm *n* = 5 *n* (%)	*P* 0.06
Yes	11 (52.4)	5 (100.0)	
Unsure	1 (4.8)	0	
No	9 (42.8)	0	

20. Did you have an injection of pethidine/meptid as pain relief?

	RCT n = 58 *n* (%)	Preference Arm n = 20 *n* (%)	*P* 0.34
No	40 (69.0)	10 (50.0)	
Unsure	0	1 (5.0)	
Yes	18 (31.0)	9 (45.0)	

If 'Yes' – how effective was it in relieving the pain?

	RCT *n* = 18 *n* (%)	Preference Arm *n* = 8 *n* (%)	*P* 0.22
Very	7 (38.9)	2 (25.0)	
Slightly	7 (38.9)	2 (25.0)	
Not at all	4 (22.2)	4 (50.0)	

21. Did you feel under pressure to have the injection? (please circle one answer)

	RCT *n* = 43 *n* (%)	Preference Arm *n* = 16 *n* (%)	*P* 0.67
Yes, a lot	1 (2.3)	0	
Yes, a bit	1 (2.3)	2 (12.5)	
Unsure	0	0	
No	20 (46.5)	6 (37.5)	
No, not at all	21 (48.9)	8 (50.0)	

22. How do you now feel about having had, or not having had, the injection? (please tick one box)

	RCT *n* = 45 *n* (%)	Preference Arm *n* = 15 *n* (%)
I am pleased about it	28 (62.3)	10 (66.7)
I have mixed feelings about it	5 (11.1)	2 (13.3)
I am quite unhappy about it	2 (4.4)	2 (13.3)
I have no particular feelings either way	8 (17.8)	1 (6.7)
Other	2 (4.4)	0

23. Did you have an epidural? (please circle one answer)

	RCT *n* = 58 *n* (%)	Preference Arm *n* = 20 *n* (%)	*P* 0.40
No	43 (72.3)	15 (75.0)	
Unsure	0	1 (5.0)	
Yes	15 (25.9)	4 (20.0)	

If 'Yes' how effective was it relieving the pain?

	RCT *n* = 15 *n* (%)	Preference Arm *n* = 4 *n* (%)	*P* 0.09
Very	12 (80.0)	3 (75.0)	
Slightly	0	0	
Not at all	3 (20.)	1 (25.0)	

24. Did you feel under pressure to have an epidural? (please circle one answer)

	RCT *n* = 39 *n* (%)	Preference Arm *n* = 12 *n* (%)	*P* 0.63
Yes, a lot	2 (5.1)	1 (8.3)	
Yes, a bit	3 (7.7)	0	
Unsure	0	0	
No	15 (38.5)	3 (25.0)	
No, not at all	19 (48.7)	8 (66.7)	

25. How do you feel now about having had, or not having had, an epidural? (please tick one box)

	RCT *n* = 43 *n* (%)	Preference Arm *n* = 13 *n* (%)
I am pleased about it	29 (67.4)	7 (53.8)
I have mixed feelings about it	5 (11.6)	2 (15.4)
I am quite unhappy about it	5 (11.6)	1 (7.7)
I have no particular feelings either way	3 (7.1)	2 (15.4)
Other	1 (2.3)	1 (7.7)

26. Overall, how do you feel about the way you responded to the pain of labour? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.38
Satisfied	44 (74.6)	13 (65.0)	
Neither particularly satisfied or dissatisfied	8 (13.6)	4 (20.0)	
Dissatisfied	7 (11.8)	3 (15.0	

27. Was there anything that you wanted immediately after delivery eg. having the baby delivered onto your stomach (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.80
Yes	29 (49.2)	9 (45.0)	
No	30 (50.8)	11 (55.0)	

28. If 'Yes' what did you want (please write below)

Comment *	RCT *n*	Preference Arm *n*
Skin to skin immediately	17	2
To hold and examine baby immediately	4	5
To breast feed immediately	7	2
Husband to cut cord	4	1
Husband to hold baby immediately	2	0
Cup of tea	1	0
To know sex of baby	1	0
Physiological third stage	2	1
Wanted to stay in pool for longer	1	1
Baby cleaned before given to me	0	1
No drugs in labour	0	1

*Some women gave more than one response

29. Did you get what you wanted? (please circle one answer)

	RCT *n* = 32 *n* (%)	Preference Arm *n* = 14 *n* (%)	*P* 0.55
Yes	23 (71.9)	9 (64.3)	
No	9 (28.1)	5 (35.7)	

30. If 'No' why not? (please write below)

Response *	RCT *n*	Preference Arm *n*
Everything went wrong	1	0
Cord round baby's neck midwife cut it	2	0
Baby had to be checked by Paediatrician First	3	0
I had a caesarean section	1	1
Husband not present for birth	1	0
Others waiting to use pool	1	0
Midwife would not let me stay in pool	0	1
I was too tired	0	1
I needed general anaesthetic for 30 tear	0	1
Baby delivered before birth plan written	1	0

* Some women gave more than one response

31. Did you have electronic fetal monitoring at any time during your labour? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.93
Yes, continuously	17 (28.8)	5 (25.0)	
Yes, at intervals	24 (40.7)	9 (45.0)	
No, not at all	8 (13.6)	5 (25.0)	
Unsure	10 (16.9)	1 (5.0)	

32. Do you think you should have been electronically monitored? (please circle one answer)

	RCT *n = 47* *n* (%)	Preference Arm n = 16 *n* (%)	*P* 0.22
No, not at all	5 (10.6)	4 (25.0)	
Yes, but less often	3 (6.4)	2 (12.5)	
Yes, but a bit more	0	0	
It was fine as it was	39 (83.0)	11 (68.8)	

33. Please explain your answer below:

Response *	RCT *n*	Preference Arm *n*
Happy with sonicaid monitoring	5	3
It restricted me	3	2
I was happy with continuous monitoring	4	2
Continuous monitoring meant it was difficult to relax	2	1
While on the monitor pain was greater	3	1
Reassuring to be continuously monitored	2	2
Had to be monitored before pool use	2	2
Midwife said continuous monitoring had To be done	2	2
Problems with labour so continuous needed	3	0
Epidural so continuously monitored	1	0
Midwife said she could check baby was ok If I was continuously monitored	1	0
Would not want continuous monitoring again	1	0

* May be more than one response per woman

34. Were your waters broken artificially?

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.85
Yes	30 (50.8)	11 (55.0)	
No	28 (47.5)	8 (40.0)	
Unsure	1 (1.7)	1 (5.0)	

35. If 'Yes' were you happy with this?

	RCT *n* = 30 *n* (%)	Preference Arm *n* = 11 *n* (%)	*P* 0.95
No	2 (6.7)	1 (9.1)	
Not sure	0	0	
Didn't mind	7 (23.3)	3 (27.2)	
Yes	21 (70.0)	7 (63.7)	

36. Please explain your response:

Response	RCT *n*	Preference Arm *n*
Labour not progressing	12	6
Midwife advised me to have it	3	0
Part of induction process	2	1
I requested it	1	0
Not sure if waters had broken	1	0
Doctors advised me to have it	1	0
Wouldn't have broken without ARM	1	0
Should have been done sooner	1	0
Not a normal process – invasive	0	1
Had Caesarean section	0	1

37. Were you given any drugs, either in the form of a drip, or vaginal gel to induce your labour (start your labour off)? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.03
Yes	12 (20.3)	0	
No	47 (79.7)	20 (100.0)	
Unsure	0	0	

38. If 'Yes' do you think you should have been given these drugs to induce your labour? (please circle the correct answer)

	RCT *n* = 12 *n* (%)	Preference Arm n = 0 *n* (%)
Yes	11 (91.7)	0
Didn't mind	0	0
No	1 (8.3)	0

39. Please explain your answer:

	RCT *n*	Preference Arm *n*
Overdue so needed them	4	0
Bleeding so needed to start labour	3	0

40. Did you have a surgical delivery (i.e. a forcep, ventouse, (vacuum extraction) or Caesarean Section)? (please circle the appropriate answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.95
Yes	13 (22.0)	4 (20.0)	
No	45 (76.3)	16 (80.0)	
Unsure	1 (1.7)	0	

41. If 'Yes' please explain why you had a surgical delivery (i.e. forcep, ventouse or Caesarean Section)

	RCT *n*	Preference Arm *n*
Baby distressed	3	1
Long second stage	2	1
Big baby	2	0
I asked for assistance	1	0
Baby stuck in wrong position	1	1
Failed induction	1	0
Baby breech	0	1

42. If 'Yes' to number 40 – do you think you should have had the method of delivery that you did have? (please circle correct answer)

	RCT *n* = 13 *n* (%)	Preference Arm *n* = 4 *n* (%)	*P* 0.24
Yes	10 (76.9)	4 (100.0)	
Didn't mind	1 (7.7)	0	
Not sure	1 (7.7)	0	
No	1 (7.7)	0	

43. Please explain your answer:

	RCT *n*	Preference Arm *n*
Wanted baby out for safety reasons	5	2
I asked for it	1	0
I was exhausted so needed it	2	1
Yes, unable to push with epidural	1	0
Needed due to baby's size & position	1	0
Should have been done sooner	1	1
I had no choice	1	0

44. Did you have perineal ('tail end'/episiotomy) stitches? (please circle correct answer)

	RCT *n*= 57 *n* (%)	Preference Arm *n* = 20 *n* (%)	*P* 0.98
No	29 (50.9)	11 (55.0)	
Unsure	1 (1.8)	0	
Yes	27 (47.3)	9 (45.0)	

45. If 'Yes' why did you need stitches? (please circle the correct answer)

	RCT *n* = 27 *n* (%)	Preference Arm *n* = 9 *n* (%)
Episiotomy (cut)	16 (59.3)	2 (22.2)
Tear	11 (40.7)	7 (77.8)
Don't know	0	0

46. If you had stitches, who were you stitched by? (please circle the correct answer)

	RCT *n* = 27 *n* (%)	Preference Arm *n* = 9 *n* (%)
Midwife	16 (59.3)	6 (66.7)
Doctor	11 (40.7)	1 (11.1)
Medical student/student midwife	0	1 (11.1)
Don't know	1 (37.0)	1 (11.1)

47. Was the person who stitched you the same person who delivered the baby? (please circle the correct response)

	RCT *n* = 27 *n* (%)	Preference Arm *n* = 9 *n* (%)	*P* 0.10
Yes	13 (48.1)	7 (77.8)	
Unsure	0	1 (11.1)	
No	14 (51.9)	1 (11.1)	

48. If you had stitches have you had any problems with them since you have been home?

	RCT *n* = 27 *n* (%)	Preference Arm *n* = 9 *n* (%)	*P* 0.18
No	18 (66.7)	8 (88.9)	
Yes	9 (33.3)	1 (11.1)	

If 'Yes' please explain

Response *	RCT *n*	Preference Arm *n*
Infected needed antibiotics	7	1
Painful	3	2
Problem passing stools	1	0
Stitches irritated haemorrhoids	1	0
Needed some stitches removed	1	0
Needed to be re-stitched as painful	1	0

* Some women gave more than one response

49. Did you have your chosen birth companion with you in labour? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.41
Yes, for all or most of the time	57 (96.6)	20 (100.0)	
Yes, some of the time	1 (1.7)	0	
No, not at all	1 (1.7)	0	

50. Did you feel that there were lots of people coming in and out of the room while you were in labour? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.20
Yes, a lot	7 (11.8)	2 (10.0)	
Yes, quite a few	6 (10.2)	5 (25.0)	
No, hardly any	46 (78.0)	13 (65.0)	

51. Approximately, how many midwives came into your room when you were in labour?

Study Arm	Number of Midwives (*p* = 0.33)						
	1	**2**	**3**	**4**	**5**	**6**	**7**
RCT	4	24	21	4	4	1	1
'Preference arm'	1	11	5	3	0	0	0

52. Had you already met any of the midwives who looked after you in labour? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.40
Yes	19 (32.3)	8 (40.0)	
No	37 (62.7)	12 (60)	
Not sure	3 (5.0)	0	

53. Was there one midwife who was with you throughout your labour? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.71
Yes	41 (69.5)	13 (65.0)	
No	18 (30.5)	7 (35.0)	

54. Was there always a member of staff available when you needed one? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.56
Yes	53 (89.9)	17 (85.0)	
No	6 (10.1)	3 (15.0)	
Not sure	0	0	

55. Were there every more staff present than you wanted or times when staff were present but you and your birthing companion would have preferred to be alone? (please circle the correct answer)

	RCT *n* = 59 *n* (%)	Preference Arm *n* = 19 *n* (%)	*P* 0.81
Yes	1 (1.7)	2 (10.0)	
No	58 (98.3)	16 (80.0)	
Not sure	0	1 (5.0)	

56. Were you seen by any doctors while on labour ward? (please circle the correct answer)

	RCT *n* = 59 *n* (%)	Preference Arm *n* = 18 *n* (%)	*P* 0.03
Yes	33 (55.9)	6 (33.3)	
No	23 (39.0)	11 (61.1)	
Not sure	3 (5.1)	1 (5.6)	

57. If 'Yes' do you know why? Please explain.

Response *	RCT *n*	Preference Arm *n*
Concerns over baby's condition	3	2
For forcep or caesarean delivery	3	1
Midwife advised me to see doctor	2	0
Prolonged labour	2	2
Labour complications	4	0
To be stitched	2	0
Doctor broke my waters for induction	3	0
Don't know	2	0
I had an infection	2	0
I was pyrexial so doctor needed to see me	2	0
I haemorrhaged	1	0
To assess me and my baby	1	1
To confirm breech position	1	0
Doctor looked at my notes and advised me to have an ARM	1	0

* Some women gave more than one response

58. If there was any kind of emergency during your labour, how were decisions made during that time? (please tick the relevant box)

	RCT *n* = 58 *n* (%)	Preference Arm *n* = 20 *n* (%)
Not applicable	30 (51.7)	12 (60.0)
The staff just got on with it	5 (8.6)	3 (15.0)
The staff made the decisions but kept me informed	14 (24.1)	2 (10.0)
The staff discussed things with me before making a decision	7 (12.1)	3 (15.0)
The staff gave me their assessment but I was in control of the decision	2 (3.4)	0
I decided what was to be done	0	0

59. How do you feel that most of the non-emergency decisions about your labour were made? (please tick one box)

	RCT *n* = 58 *n* (%)	Preference Arm *n* = 20 *n* (%)	*P* 0.27
The staff just got on with it	4 (6.9)	4 (20.0)	
The staff made the decisions but kept me informed	14 (24.1)	5 (25.0)	
The staff discussed things with me before reaching a decision	25 (43.1)	6 (30.0)	
The staff gave me their assessment but I was in control of the decision	14 (24.1)	5 (25.0)	
I decided what was to be done	1 (1.7)	0	

60. In general did you feel in control of what the staff were doing to you during labour? (please circle the correct answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.83
Yes, always	24 (40.7)	9 (45.0)	
Yes, most of the time	27 (45.8)	4 (20.0)	
Some of the time	5 (8.5)	4 (20.0)	
No, hardly at all	3 (5.0)	3 (15.0)	

61. Looking back over your pregnancy, do you feel that overall you had been given: (please tick one box)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.48
Too much information	0	0	
The right amount of information	49 (83.1)	15 (75.0)	
Too little information	4 (6.8)	3 (15.0)	
Too much about somethings, not enough about others	6 (10.1)	2 (10.0)	

62. Please would you circle whichever of the words below which describe any of the staff who saw you during labour. Please circle all appropriate words both positive and negative if applicable

	RCT *n* (%)	Preference Arm *n* (%)
Rushed	11 (18.6)	2 (10)
Humorous	31 (52.4)	12 (60)
Insensitive	1 (1.7)	1 (5)
Unhelpful	4 (6.8)	1 (5)
Sensitive	40 (67.8)	7 (35)
Polite	41 (69.5)	12 (60)
Warm	44 (74.6)	12 (60)
Rude	2 (3.4)	0
Off-hand	3 (5.1)	3 (15)
Considerate	42 (71.2)	8 (40)
Supportive	39 (66.1)	14 (70)
Bossy	4 (6.8)	1 (5)
Informative	39 (66.1)	8 (40)
Inconsiderate	3 (5.1)	0
Condescending	1 (1.7)	0

63. If there is anything else you would like to write about how the staff treated you please write below:

	RCT *n*	Preference Arm *n*
Doctor off-hand/rude	4	1
Could not have asked for better midwives	24	5
Already knew some of the staff	1	0
Midwife concerned about study	1	0
Empathetic midwives	1	0
Midwives too rushed to care	3	0
Midwives negative about pool use	2	1
Midwife indecisive about pool use	0	1
Midwife not confident with waterbirth	1	0
Midwives professional	1	0
Midwife left me waiting for a long time with no explanation	1	0
Midwives gave me a good experience	1	0
Apologetic I could not use pool	1	0
Experienced complete continuity of care	0	1
Midwife very kind to my partner	1	0

64. Did you feel in control during contractions? (eg. were you aware of what was happening around you) Please circle one answer

	RCT *n* = 59 *n* (%)	Preference Arm *n* = 19 *n* (%)	*P* 0.40
Yes, for all or most of the time	28 (47.5)	11 (57.9)	
Yes, for some of the time	29 (49.2)	5 (26.3)	
No, not at all	2 (3.3)	3 (15.8)	

65. Did you ever feel that you lost control of the way you behaved during labour? (please circle one answer)

	RCT *n* = 58 *n* (%)	Preference Arm *n* = 19 *n* (%)	*P* 0.70
Yes, most of the time	2 (3.3)	1 (5.2)	
Yes, for some of the time	34 (57.7)	9 (47.4)	
No, not at all	23 (39.0)	9 (47.4	

66. Here are a list of the words that some women have used to describe their feelings during labour. Please circle all of the words that describe how you felt.

	RCT *n* = 59 *n* (%)	Preference Arm *n* = 20 *n* (%)
Overwhelmed	18 (30.5)	9 (45.0)
Out of control	12 (20.3)	2 (10.0)
Detached	12 (20.3)	3 (15.0)
Calm	19 (32.2)	5 (25.0)
Alert	17 (28.8)	4 (20.0)
Helpless	12 (20.3)	7 (35.0)
Confident	16 (27.1)	3 (15.0)
Frightened	27 (45.8)	6 (30.0)
In control	20 (33.9)	5 (25.0)
Excited	32 (54.2)	5 (25.0)
Involved	23 (39.0)	4 (20.0)
Powerful	2 (3.4)	3 (15.0)
Dopey	14 (23.7)	2 (10.0)
Powerless	7 (11.9)	5 (25.0)
Challenged	22 (37.3)	6 (30.0)

67. What was the best thing about the birth?

Response *	RCT *n*	Preference Arm *n*
Having a natural birth	4	2
Safe arrival of baby	4	0
Ability to feel everything	1	0
Use of pool	3	1
The waterbirth	1	0
Having a home birth	0	1
Awake for delivery	1	0
Birthing pool peaceful	2	0
Skin to skin with baby/feeding baby	2	0
Support from staff/husband	5	1
End of pain	2	0
Better experience than first birth	0	1
Meeting/holding baby	16	10
Feeling in control in pool	0	2
No stitches	1	0
Sense of achievement	3	0
Speed of the birth	5	0
Only used gas and air	2	0
Epidural	1	0
Having no pain relief	3	1
When all over	7	1
My level of control	2	0
Seeing husband overwhelmed	3	0
Confronting my fears	0	1
Commitment of staff	0	1

68. What was the worst thing about the birth?

Response *	RCT *n*	Preference Arm *n*
The pain of the contractions	17	7
Not having a waterbirth	5	0
Being stitched	4	0
Pushing	3	2
How painful contractions were after ARM	1	1
All of it	1	0
Baby admitted to NICU	0	1
Baby needing resuscitation	1	0
Baby's heart beat dropping	1	0
Having episiotomy	1	0
Hearing other women scream	1	1
Cold pool water	2	0
Delivery of placenta	1	0
Doctors having off-hand manner	1	0
Feeling of inadequacy as needed IOL	1	1
Having to leave pool and the increase in pain I felt	2	0
Having to resist the urge to push	1	0
Interventions I had	2	0
No one explained anything to me	2	1
Just before baby's birth	1	0
Having to move several times to different locations when in labour	1	0
Staff anxiety	1	0
Felt I did not cope well	1	1
Did not hold baby for long time as on HDU	1	0
Having to wait for a midwife	0	1
Not getting epidural I wanted	1	0
Nobody listened to me	1	0
Midwife's disbelieving attitude	0	1
The fear	0	1
The epidural	2	0
Tearing	3	0
Having pethidine	1	0
Intensity of contractions	2	0
Not getting birth I hoped for	1	0
The fetal scalp electrode	1	0

69. What, if anything, surprised you about the birth?

Response	RCT *n*	Preference Arm *n*
How painful it was	4	3
How quick labour was	10	4
Pain not as bad as expected	5	0
Being in control	2	2
Baby's size	2	0
Being able to push baby out	2	1
How much easier it is second time	1	0
The epidural and how dead my legs felt	1	0
Gas and air didn't work	1	0
Having an episiotomy	1	0
How calm I felt	2	1
My coping skills	2	0
The complexity of birth	0	1
How easy I found it	1	0
How the actual birth felt	1	0
How suddenly labour started	1	0
How relaxed staff were/humour of staff	2	0
Length of contractions	2	0
Needing forceps/LSCS	1	1
Indecisiveness of midwives	0	1
I had no desire to push	1	0
Not needing stitches	2	0
Requiring stitches	0	1
What a relaxed experience it was	1	0
The feeling of relief when birth was over	2	0
The time it took midwives to tell me sex of baby	1	0
Vomiting during labour	0	1
How fantastic waterbirth was	2	0

70. Was the birth a fulfilling experience? (please circle one answer)

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.003
Yes	49 (83.1)	10 (50.0)	
No	7 (11.9)	6 (30.0)	
Not sure	3 (5.0)	4 (20.0)	

71. Did you breast feed your baby? (please tick the appropriate box)

	RCT *n* = 58 *n* (%)	Preference Arm *n* = 20 *n* (%)	*P* 0.84
No, not at all	30 (51.7)	5 (25.0)	
Yes, I still am	10 (17.2)	6 (30.0)	
Yes, but I stopped	18 (31.1)	9 (45.0)	

72. If you have stopped breast feeding, why did you stop breast feeding?

Response *	RCT *n*	Preference Arm *n*
Advised to stop as inadequate milk	3	3
Needed to take medication	2	0
Baby continually feeding	2	3
Baby not interested	0	2
Baby had colic	1	0
Sore nipples/bleeding	3	1
Did not enjoy it	2	0
I was ill	1	0
Baby inadequate weight gain	0	1
Difficult with other children at home	1	0
Anxious baby not getting enough	1	0
Doctors told me to stop	1	0
Uncomfortable feeding in public	0	1

* Some women gave more than one response

73. Please circle the words that you feel describe your baby:

	RCT *n* (%)	Preference Arm *n* (%)
Placid	21 (35.6)	6 (30)
Responsive	44 (74.6)	15 (75)
Grizzly	10 (16.9)	2 (10)
Talkative	21 (35.6)	7 (35)
Alert	52 (88.1)	18 (90)
Stubborn	11 (18.6)	3 (15)
Fascinating	38 (64.4)	11 (55)
Angry	1 (1.7)	0
Demanding	25 (42.4)	6 (30)
Cuddly	42 (71.2)	13 (65)
Exhausting	12 (20.3)	2 (10)
Fretful	3 (5.1)	0
Unresponsive	0	0
Draining	3 (5.1)	1 (5)
Determined	11 (18.6)	3 (15)
Contented	31 (52.5)	14 (70)

74. Has your baby had any problems since leaving hospital, such as feeding problems, having to see the doctor, needing any medicines or being readmitted to hospital?

	RCT *n* (%)	Preference Arm *n* (%)	*P* 0.56
Yes	25 (42.4)	7 (35.0)	
No	34 (57.6)	13 (65.0)	

75. If 'Yes' please write all the problems below even if they now seem trivial.

Response *	RCT *n*	Preference Arm *n*
Admitted to hospital – blood in nappy	1	0
Admitted for investigations at 4 weeks	1	0
Cold and catarrah	2	0
Ear infection	2	0
Eye infection	2	1
Colic	6	0
Thrush	3	3
Feeding difficulties	2	1
Constipation	3	0
Pyrexia	1	0
Baby acne	1	0
Pyloric stenosis op	0	1
Antibiotics for skin rash	1	1
On phenobarbitone	1	0
Antibiotics for throat infection	1	0
Eczema	1	0
Silver nitrate to tummy button	1	0
Admitted to hospital following 'blue' episode	0	1

* Some women gave more than one response

IF YOU PARTICIPATED IN THE RANDOMISED CONTROLLED TRIAL, PLEASE ANSWER THE FOLLOWING QUESTIONS (this means that you were unable to choose whether to use the water pool or not)

76. Do you feel that by participating in the randomised controlled trial this affected your birthing experience? (please circle the correct answer)

	RCT *n* = 57 *n* (%)
Yes	5 (8.8)
No	52 (91.2)

77. Please explain your answer

	Number of Women *
Happy with either a waterbirth or a land birth	15
Did not receive different care from other women	6
Wanted water and randomised to water	4
Happy to help provide information	4
No pressure to go into study, discussed thoroughly with midwife	4
Depends on 'circumstances on the day', not guaranteed use of pool so happy to participate	4
All I cared for was a healthy baby, I was happy with trial care	2
No woman can be sure of outcome of labour	1
No reason given	22

* Some women gave more than one answer

78. Would you participate in a similar trial again?

	RCT ***n* = 57** ***n* (%)**
Yes	52 (91.2)
No	2 (3.5)
Unsure	3 (5.3)

79. Please explain your answer:

	Number of Women *
Happy to help provide health information	14
Want to help future parents	11
To support research	10
Research is good as it provides more information (*n* = 8)	
Research improves care so more mothers should join studies *(n* = 2)	
Did not interfere/change anything	8
To help midwives	6
Want to improve the experience of childbirth for future women	5
Fulfilling/exciting to participate	4
Helped me to get desired birth (trial midwife available to support waterbirth)	3
To help future babies	3
Still would not mind either method	3
Built up a relationship with a midwife who was at the birth	2
Nothing sinister/worrying about joining a research project	2
No pressure to take part so was happy to do so	2
Did not cost me anything	1
No reason given	6

* Some women gave more than one response

80. Do you feel that you were expected to provide too much information for the trial? (please circle the appropriate response)

	RCT ***n* = 58** ***n* (%)**
Yes	1 (1.7)
No	56 (96.6)
Unsure	1 (1.7)

81. How important was it to you that you were providing information for future parents and health care professionals? (Please circle the correct response)

	RCT **n = 58** ***n* (%)**
Definitely not at all important	0
Unimportant	1 (1.7)
Unsure	0
Important	21 (36.2)
Very important	36 (62.1)

Thank you for taking the time to complete this questionnaire. Please seal it in the envelope provided.

If there are any questions or worries you have after filling in the questionnaire please contact Joanne Woodward at the Research & Development Centre telephone number .

Appendix 13.: Ethical Approval: Semi-structured Interviews

The University of Birmingham

School of Health and Population Sciences
(Nursing and Physiotherapy)

Feedback on Application for Ethical Approval - MSc Advancing Practice

Name: Joanne Woodward **Supervisor:** Carolyn Hicks/Sue Kelly

Title of Project: An investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace/

…… Approved

…✓…. Approved subject to comments

…… Re-submission required

Comments:

- Consideration with your supervisor of safety in relation to location of interviews is required.
- Stored information must be password protected to maintain security. The list linking names with codes must be forwarded and stored at the university to maintain confidentiality.
- Participant information:
  Include a statement indicating that participation has no implications for employment.
  The use of password protection for files and storage of linked names and codes in a different location should be included.
  A simple explanation of Q methodology should be added to ensure participant understanding.

Please send revised copies of your documentation to Sue Kelly: [redacted] before commencing your study.

Reviewers: C Wright **Date:** 07/12/2009
Dr S Higgs

Appendix 14: Information Sheet for Midwifery Semi-Structured Interviews

School of Health and Population Sciences

Nursing and Physiotherapy

UNIVERSITY OF BIRMINGHAM

Participant Information Sheet

I am a student on the Research Degree programme and am undertaking this research study as part of the assessment for my degree.

1. **Study title**

An Investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace.

2. **Invitation**

Thank you for reading this information sheet. You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part.

3. **What is the purpose of the study?**

There have been many changes to maternity services in the last few years and midwives have been encouraged to undertake new practices and extend their role. There has also been a drive to encourage maternity services to provide women with choice, continuity and control over their birthing experience.

One choice some women make is to request a waterbirth. As part of a larger waterbirth research project, I would like to find out about your experiences with waterbirths by asking a few questions. The answers you provide will help to devise a set of statements which would be used to obtain information from a much larger group of midwives.

4. **Why have I been chosen?**

You have been invited to take part in this study because you are a Registered Midwife.

5. **Do I have to take part?**

It is up to you to decide whether or not to take part. This information sheet is yours to keep. If you agree to take part, I will ask you to sign a consent form to show that you are willing to participate. If you decide to take part you are still free to withdraw at any time without giving a reason.

6. **What will happen to me if I take part?**

If you decide to take part, I will ask you some questions about the experience of a waterbirth service in your workplace. The interview will last about thirty - forty minutes.

7. **What do I have to do?**

I would like you to answer some questions about the provision of a waterbirth service in the maternity unit you work in, what training you have received for waterbirths and your opinions about the waterbirth service currently available in your workplace. I will make some written notes and will ask you to read them, once typed, to check that your responses have been recorded accurately.

8. **What are the possible disadvantages and risks of taking part?**

If you agree to take part you will be asked to spare some of your private time so that I can interview you. The interview can take place at a venue of your choice. If you do not wish to answer any questions I ask you, you may decline to answer or we will end the interview if you prefer.

Participation in this study has no implications for your employment.

9. **Will my taking part in this study be kept confidential?**

All information that is collected about you during the course of the interview will be kept strictly confidential. All participants will be allocated a code to ensure confidentiality and the document linking names and codes will be stored at a separate location at Birmingham University. All electronic data will be password protected. There will be no tape recordings taken of the interview. You will not be identified in any report, publication or presentation.

10. **What will happen to the results of the research study?**

The results will be presented within the university, and may be used for conference presentations or publications. The results be also be used to produce statements for further research using Q Methodology. Q Methodology is a way of obtaining the viewpoint of individuals by asking them to rank the statements (known as 'Q sorts') in order of importance.

11. **Who has reviewed the study?**

The School of Health Sciences

12. **Contacts for further Information**

Student: Joanne Woodward Supervisor: Carolyn Hicks

Email: [redacted]
Email: [redacted]

Appendix 15: Consent Form for Midwifery Interviews

School of Health and Population Sciences
Nursing and Physiotherapy

UNIVERSITY OF BIRMINGHAM

Participant Identification for this study:

CONSENT FORM

Title of Project:

An Investigation into midwives' experience regarding the provision of a waterbirth service within their workplace.

Name of Researcher: Joanne Woodward

Please initial box

1. I confirm that I have read and understand the information sheet dated December 2009 (Version 1.1) for the above study and have had the opportunity to ask any questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐

3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

(Copies of consent for: participant, researcher)

All information collected will be stored in accordance with the Data Protection Act 1998.

Appendix 16: Semi-Structure Midwifery Interview Schedule

An Investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace

Semi-structured Interview Schedule

Introduction

Thank you for agreeing to be interviewed today. There have been many changes to maternity services in the last few years and midwives have been encouraged to undertake new practices and extend their role. There has also been a drive to encourage maternity services to provide women with choice, continuity and control over their birthing experience.

One aspect of care I am interested in is waterbirths. I hope to interview a total of 5-6 midwives to ask about their experiences of waterbirths. Your answers will be treated confidentially and no one will be able to identify you from any further work or reports which are written.

If you would like to terminate the interview at any time, please tell me and I will stop. Are you willing to answer my questions? If so, please sign the consent form.

Introductory questions

1. **Please could you tell me your:**

Forename: Surname:

2. **How many years have you worked as a midwife? …….**years

3. **Which hospital do you work in? ……**

4. **How many women give birth in your unit each year?**

5. **On average, how many births have you been involved with each year?**

6. **Where is your main area of work?** (Circle correct response)

Hospital Community Clinic Specialist Role Other (please state)…….

7. What age group are you?

21 – 30 ☐
31 – 40 ☐
41 – 50 ☐
51 - 60 ☐
61 - 70 ☐

8. Does the unit you work in have a birthing pool?

9. Do women have waterbirths in your unit?

10. What training have you had for waterbirths?

11. How many waterbirths have you been involved with?

Core Questions

12. If the answer to Question 6 is 'none' please explain why you have not been involved with waterbirths.

13. Please could you describe your experience of waterbirths? (only ask if they have been involved with waterbirths)

Prompts/Follow-up questions
Have you had positive experience with good outcomes for mother and baby?
Have you had negative experience with poor outcomes for mother and baby?
How often do you offer women the chance of a waterbirth?
How different is it to care for a woman having a waterbirth compared with a traditional birth?

14. What professional skills do you think are required to undertake waterbirths?

Prompts/follow-up questions
What impact does providing a waterbirth service have on:

- Your role as a midwife
- Your midwifery clinical practice?

Does providing a waterbirth service extend the role of the midwife? Please explain.

15. How competent do you feel to undertake waterbirths?

Prompts/Follow-up questions
How did you obtain your waterbirth skills?

What additional skills do you feel you need to gain?
What are your thoughts when a woman asks to use the birthing pool?

16. What are your concerns about waterbirths?:

- For the woman
- For yourself as the midwife
- For the maternity service

Prompts/follow-up questions
Are there additional risks for the:

- Woman for example increased risk of bleeding
- Baby for example increased risk of infection, inhaling water
- You as a midwife for example effects on your personal life
- Maternity service – for example increased stress and sickness levels

17. What are the possible health and safety issues regarding waterbirths?

Prompts/follow-up questions

- Cleaning the pool
- Midwifery back injuries
- Emergency evacuation of the pool

18. What do you feel are the benefits of waterbirths?:

- For the woman
- For yourself as a midwife
- For the maternity service

Prompts/follow-up questions
What impact do waterbirths have on a woman's birth experience?
How do you feel waterbirths affect your job satisfaction levels?
What are the benefits for the maternity service when providing a waterbirth service for example confident staff and less stress and sickness levels

19. What are the resource implications when offering a waterbirth service?

Prompts/follow-up questions
Should waterbirths be offered instead of other methods of pain relief?
How do staffing levels affect whether a woman is offered a waterbirth?
What, if any, additional resources do midwives need in order to offer a waterbirth service?
Are there financial implications when offering a waterbirth service?
Have there been occasions when a woman has asked to use the pool and you have not been able to fulfil her request? Please explain why not.

20. What are the legal aspects which need to be considered when offering a waterbirth service?

Prompts/follow-up questions
What measures do you take to reduce risk when using the birthing pool?
What documents are available to support midwifery practice in order to reduce the risk of litigation?
How does a waterbirth service impact on risk of litigation?

21. How does the culture of a maternity unit impact on the provision of a waterbirth service?

Prompts/follow-up questions
What response have you received from colleagues when you have wanted to offer the birthing pool to a woman? For example are they supportive, do they work as a team?
How are users of the maternity service encouraged to give their views about maternity services in your unit?
What changes would you make to the labour ward to encourage use of the birthing pool? For example more home from home environment required?
How does the attitude of doctors influence the use of the birthing pool in hospital? Do they dominate midwives and voice their disapproval of waterbirths?
What is your response when a woman who does not 'fit' the criteria to use the pool requests a waterbirth?

22. What factors are important to consider when introducing a new practice, such as waterbirths, to ensure successful implementation?

Prompts/follow-up questions
What are your thoughts when you learn that a new practice is going to be implemented?
What has been your experience of change in practice? For example has the reality met your expectations?
What preparations are needed before implementing a new practice?
What about training, communication about progress, guidelines?

23. The Royal College of Midwives has stated that all midwives should be able to support a woman in the birthing pool. What are your thoughts about this statement?

Prompts/follow-up questions
Should waterbirths be a normal aspect of midwifery-led care?
What effect does a waterbirth service have on your status as a midwife within the maternity unit?

24. Would you recommend to women waterbirths as the first option for pain relief, and please explain your reasons?

25. Those are all the questions I would like to ask you today. Is there anything else you would like to discuss regarding:

- **the provision of a waterbirth service**
- **any of the aspects we have talked about today**

Thank you for answering my questions.

Appendix 17.: Ethical Approval: Q Methodology

The University of Birmingham

School of Health and Population Sciences (Nursing and Physiotherapy)

Feedback on Application for Ethical Approval

Name: Joanne Woodward **Supervisor:** Sue Kelly/Collette Clifford

Title of Project: An investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace using Q Methodology

…… Approved

…✓…… Approved subject to comments

…… Re-submission required

Comments:

- A reference to support Q methodology for this study should be provided.
- Need to keep data for 10 years in line with University Code of Conduct for Research.
- Ensure confidentiality of information and secure storage.
- Changes on PI and questionnaire documents required, (track changes on docs provided). Remove dashes before +4 and -4 statements above columns on the Q sort grid.

Please send revised copies of your documentation to Dr Sue Kelly (Ethics Lead N&P): [redacted] before commencing your study.

Reviewers: C Wright **Date:** 26/07/2010

F Badger

Appendix 18.: Participant Information Sheet: Q Methodology

School of Health and Population Sciences
Nursing and Physiotherapy

UNIVERSITY OF BIRMINGHAM

Participant Information Sheet

I am a student on the Research Degree programme and am undertaking this research study as part of the assessment for my degree.

1. **Study title**

An investigation into midwives' experiences and opinions concerning the provision of a waterbirth service within their workplace using Q Methodology.

2. **Invitation**

Thank you for reading this information sheet. You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part.

3. **What is the purpose of the study?**

There have been many changes to maternity services in the last few years and midwives have been encouraged to undertake new practices and extend their role. There has also been a drive to encourage maternity services to provide women with more choice, continuity and control over their birthing experience.

One choice some women make is to request a waterbirth. I would like to find out about your thoughts of, and experiences with, waterbirths by using Q Methodology. Q Methodology is a way of obtaining the viewpoint of individuals by asking them to rank statements (known as 'Q sorts') in order of importance.

4. **Why have I been chosen?**

You have been invited to take part in this study because you are a Registered Midwife.

5. **Do I have to take part?**

It is up to you to decide whether or not to take part. This information sheet is yours to keep. If you agree to take part, I will ask you to sign a consent form to show that you are willing to participate. If you decide to take part you are still free to withdraw at any time without giving a reason.

6. **What will happen to me if I take part?**

If you decide to take part you would participate in the Q Sort so that you could provide your experiences/opinions about waterbirths. You would do this on an individual basis and any information you provide will remain confidential. I would also ask you to complete a short questionnaire about your midwifery experience.

7. **What do I have to do?**

If you decide to take part, you will complete a short questionnaire, which should take about 5 minutes. I would like you to answer some questions about the provision of a waterbirth service in the maternity unit you work in, what training you have received for waterbirths and how long you have worked as a midwife.

Once you have completed the questionnaire, I would ask you to read some instructions explaining how to carry out the Q Sort. I would then explain verbally to you, before you started the Q Sort, to ensure you are confident about the process. You would then be given a set of 41 statements to sort into categories from – 4 (meaning ' very strongly disagree') to + 4 (meaning 'very strongly agree'). You would have a Q Sorting Grid to help you sort the statements into the correct format and a Q Table to record your decisions. I would then ask you to explain further why you sorted the statements into columns -4, -3, 0 and +3, +4.

8. **What are the possible disadvantages and risks of taking part?**

If you agree to take part you will participate in a Q Sort. It is estimated that it would take you about 30 minutes to conduct the Q Sort. The Q Sort can take place at a venue of your choice. If you do not wish to answer any questions, or decide not to complete the Q Sort, you may decline to answer or you can stop the Q Sort if you prefer.

Participation in this study has no implications for your employment.

9. **Will my taking part in this study be kept confidential?**

All information that is collected about you during the course of the research will be kept strictly confidential. All paperwork will be anonymous, except for the consent forms which will be kept separate from the Q Sort paperwork. All electronic data will be password protected. You will not be identified in any report, publication or presentation.

10. **What will happen to the results of the research study?**

The results will be presented within the university, and may be used for conference presentations or publications. The results may be used to inform further research in the future. If you would like to be informed of teh results of the study you will need to provide contact details.

11. **Who has reviewed the study?**

University of Birmingham

12**. What if there is a problem?**

If you have a concern about any aspect of this study, you can contact: Mrs S Flint, Nursing and Physiotherapy, University of Birmingham, 52 Pritchatts Road, Edgbaston, Birmingham B15 2TT. Email:

13. **Contacts for further Information**

Student: Joanne Woodward Supervisor: Dr S M Kelly

Email:
Email:

Appendix 19: Q Methodology Consent form

School of Health and Population Sciences

UNIVERSITY OF BIRMINGHAM

Nursing and Physiotherapy

Participant Identification for this study:

CONSENT FORM

Title of Project:

An investigation into midwives' experience and opinions concerning the provision of a waterbirth service within their workplace using Q Methodology.

Name of Researcher: Joanne Woodward

Please initial box

1. I confirm that I have read and understand the information sheet dated July 2010 (Version 1.0) for the above study and have had the opportunity to ask any questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐

3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

(Copies of consent for: participant, researcher)

All information collected will be stored in accordance with the Data Protection Act 1998.

Appendix 20: Q Set

UNIVERSITY OF BIRMINGHAM

School of Health and Population Sciences

Nursing and Physiotherapy

Q Methodology Statements

1. I think conducting a waterbirth is more difficult than a traditional birth.
2. I feel competent to conduct waterbirths.
3. The waterbirth service is seen as low priority because services offered by doctors are given more prestige.
4. It is safe for women to stay in water for the third stage of labour.
5. I am anxious in case a baby aspirates water.
6. I feel stressed when working with women having a waterbirth because there is less technology involved.
7. I think providing a waterbirth service is too expensive because of the cost of the birthing pool and other equipment.
8. Enthusiastic leadership is important to support the waterbirth service.
9. My lack of confidence in conducting waterbirths means that I don't offer them to women.
10. I think all suitable women should be offered a waterbirth.
11. I think mothers have a more positive birth experience with a waterbirth.
12. I have had a bad experience during a waterbirth so don't offer this option any more.
13. Warm water provides good pain relief during the birth process.
14. I would like more formal training in waterbirths.
15. Conducting waterbirths increases my job satisfaction.
16. I find waterbirths a dirty, messy business.
17. I think women who use the pool have a greater chance of a normal birth.
18. Waterbirths must be offered by maternity units to enhance the service they provide to women.
19. It is difficult to gain waterbirth skills because there are not many midwives who are willing, or able, to support other midwives.
20. Women having a waterbirth have a shorter labour.
21. I am anxious about hurting my back when conducting waterbirths.
22. I think babies born in water are more alert at birth.
23. To provide a waterbirth service a maternity unit needs to increase the number of midwives.
24. I would recommend a waterbirth to a family member or friend.

25. It is difficult to maintain the water at the correct temperature during a waterbirth.
26. Risk assessment is important to prevent litigation.
27. Waterbirths should not be conducted in a busy obstetric labour ward.
28. There is insufficient evidence-based information about waterbirths to discuss the risks and benefits with women.
29. I enjoy waterbirths because I am using all my midwifery skills.
30. I think there is an increased risk of litigation if anything goes wrong.
31. Waterbirths are a part of the normal practice of a midwife.
32. I prefer to offer women a more medicalised birth.
33. For safety reasons, I think there should be two midwives present at a waterbirth.
34. I feel that being able to conduct waterbirths is an additional tool in my kit box to enable me to support women through childbirth.
35. When conducting a waterbirth I feel out of my comfort zone.
38. A waterbirth is a cost effective method of coping with pain during childbirth.
37. I worry about the risk of infection for a baby during a waterbirth.
38. A waterbirth is wonderful for a baby, from water into water, no bright lights, it is such a peaceful birth.
39. I would be more willing to conduct waterbirths if I thought midwifery managers were supportive of them.
40. I worry about having to get women out of a pool in an emergency.
41. I am anxious because the baby is born blue and takes a long time to breathe.

Appendix 21: Detailed Instructions for Q Methodology

UNIVERSITY OF BIRMINGHAM

School of Health and Population Sciences
Nursing and Physiotherapy

An investigation into midwives' experiences and opinions concerning the provision of a waterbirth service within their workplace using Q Methodology.

Detailed Instructions for Midwifery Q-sort

Please could you check that you have a pack containing the following paperwork:

- Form 1 – A Questionnaire asking for a few details about you
- Form 2 – Q Sorting Grid with numbers ranging from – 4 to + 4
- Form 3 – Q Table
- Form 4
- 41 numbered cards with statements – please check the cards to ensure you have the cards numbered from 1 - 41

Please let me know if you are missing anything from this list. If you have all the paperwork, please read the instructions below.

Instructions

1. Please answer the questions on Form 1.

2. Please look at Form 2 – the Q Sorting Grid. This has a row of columns numbered from -4 (meaning 'very strongly disagree') to + 4 (meaning 'very strongly agree'). You will be asked to sort the 41 cards on to this Grid. The Q Sort Grid states how many cards are to be sorted into each column.

3. Please look at the 41 cards. Each card has a statement which is related to waterbirths. Please could you consider each statement carefully and think how each statement reflects your own thoughts/opinions about waterbirths.

4. Look at the columns on Form 2 (the Q Sorting Grid). To complete the exercise you should organise the cards into the columns, placing the correct number of cards in each column:
    - 2 statements in the column marked '-4'
    - 4 statements in the column marked '-3'
    - 5 statements in the column marked '-2'
    - 6 statements in the column marked '-1'
    - 7 statements in the column marked '0'
    - 6 statements in the column marked '+1'
    - 5 statements in the column marked '+2'
    - 4 statements in the column marked '+3'
    - 2 statements in the column marked '+4'

There is no difference given to the importance of items which are placed in the same column. For example, all statements in column +3 are treated as the same scoring, so it does not matter if a card is placed at the top or bottom of the pile.

5. Most people find it difficult to do this prioritisation in one step. It is easier to start by separating the statements into three piles: *disagree, neutral* and *agree*.

6. Once you have three general piles, focus on the 'agree' pile. Leave the others aside and simply try to organise the cards you agree with into the appropriate number of slots for '+1', '+2','+3 and '+4' strongly agree'.

7. Now turn to the general pile you called 'disagree' and perform the same sort with the appropriate number of cards for '-1', '-2', '-3' and '-4' strongly disagree.

8. Next sort any statements you left in the 'neutral' pile.

9. You should have a complete sort that matches the number of statements listed on the Q Sort Grid. Now look at all the cards, checking the statements are placed in the correct column, and make any changes you want.

10. When you are comfortable with the sort, write the NUMBER of each statement card in the corresponding slot on the answer sheet (Form 3 – Q Table).

11. Please take time to ensure that you have written the statement numbers correctly on the Q Table (Form 3) and have not duplicated any numbers.

12. Once you have checked Form 3, please complete Form 4 to explain why you have chosen the statements you sorted as -4, -3, 0 +3 and +4.

13. If you have any questions, please ask me for help.

14. Please hand all the paperwork back to me once you have completed the exercise.

Thank you for participating in this Q Sort.

Appendix 22: Q Methodology Demographic Questionnaire

UNIVERSITY OF BIRMINGHAM

Form: 1

School of Health and Population Sciences

Nursing and Physiotherapy

An Investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace

CONFIDENTIAL

Introduction

Thank you for agreeing to participate in the Q-sort today. Please could you answer the following questions. Please remember all your responses will be treated in confidence.

Introductory questions

1. **How many years have you worked as a midwife? ……**years

2. **Do you work for a (please tick the correct response):**

NHS Foundation Trust hospital	☐
NHS Trust hospital	☐
Private Hospital	☐
Independent Midwifery Practice	☐
Not currently working	☐
Other (please state)	☐ ……

3. **Is your work (please circle the correct response):**

Full time Part-time (more than 18.75 hours)
Part-time (18.75 hours or less) Bank hours
Other (please state) ……..

4. **Approximately, how many women gave birth in your unit last year? ……**

5. **On average, how many births were you involved with last year? ……**

6. **Where is your main area of work?** (Circle correct response)

Hospital Community Clinic Specialist Role Other (please state)…….

7. What age group are you?

21 – 30 ☐ 31 – 40 ☐ 41 – 50 ☐
51 - 60 ☐ 61 - 70 ☐

8. Does the unit you work in have a birthing pool? (Please circle correct response)
Yes No Unsure

9. Do women have waterbirths in your unit? Yes No Unsure

10. What training have you had for waterbirths? (please tick all which apply)

Formal waterbirth workshop lasting at least 6 hours ☐
Formal waterbirth workshop lasting less than 6 hours ☐
Practical 'hands-on' training working with a midwife ☐
Supervised by a midwife experienced in waterbirths ☐
Read journal/books/guidelines about waterbirths ☐
Watched a waterbirth video ☐
Skills drills training for emergency evacuation of pool ☐
Practical experience of emergency evacuation of a woman from a pool ☐
Self-taught ☐
None ☐
Other (please state) …….. ☐

11. How many waterbirths have you been involved with? ……..

12. If the answer to Question 11 is 'none' please explain why you have not been involved with waterbirths.

13. Those are all the questions I would like to ask you today. Is there anything else you would like to tell me regarding:
- **the provision of a waterbirth service**
- **your experience of waterbirths**

Thank you for answering my questions.

Appendix 23.: Q Sorting Grid

School of Health and Population Sciences
Nursing and Physiotherapy

UNIVERSITY OF BIRMINGHAM

Form: 2

An Investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace

Q Sorting Grid

To what extent does each of the statements represent your viewpoint or experience of waterbirths. Please place the correct number of statements in each column with:

- \- 4 = Very strongly disagree
- \+ 4 = Very strongly agree

-4	-3	-2	-1	0	+1	+2	+3	+4
2 Cards	4 Cards	5 Cards	6 Cards	7 Cards	6 Cards	5 Cards	4 Cards	2 Cards

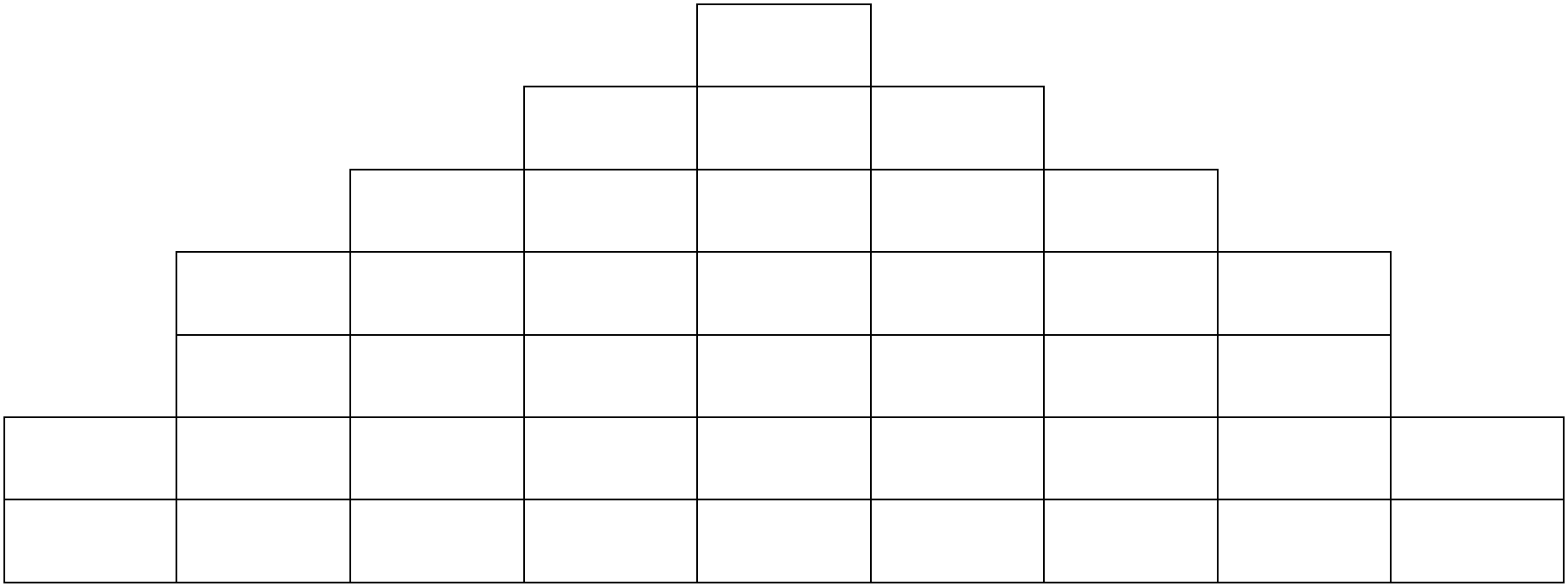
Appendix 24.: Q Sort Number Sheet

An Investigation into midwives' experiences concerning the provision of a waterbirth service within their workplace

Q Sort Number Sheet

Name:

Once you have sorted your statements using the **Q Sorting Grid**, please write the Statement Card Number in a box in the appropriate column.



Appendix 25.: Form 4

School of Health and Population Sciences
Nursing and Physiotherapy

UNIVERSITY OF BIRMINGHAM

Form: 4

Please state why you have sorted each of the cards into Sections +4 & +3.
+ 4
+ 3
Please state why you have sorted each of the cards into Sections - 4 & - 3.
- 4
- 3
Please state why you have sorted each of the cards into Section 0.
0

Appendix 26.: Form 1: Comments Written by Midwives about Waterbirth Service

Midwife 1
There is only one pool available but there are inflatable pools but are only used if midwives can inflate them.

Midwife 2
We need more birth pools

Midwife 4
I think water is great for labour, and for 'easy' births. For births that are more difficult I prefer dry land.

Midwife 5
I don't really understand why there is such a fuss about waterbirth, it is the same process as on dry land. That is, the baby is born from a woman and her anatomy and physiology are the same as dry land. What's the problem?

Midwife 6
In my hospital we don't do many waterbirths as we have a large ethnic minority population and they don't ask for waterbirths. I tried to have a waterbirth at home but ended up being transferred to hospital.

Midwife 8
The water birthing pool is available to all low-risk women and they are all informed of the advantages of the pool for either labour or birth. I have had positive experiences of caring for women in the pool to help with pain relief and also birthing in the pool.

Midwife 9
In my experience there is a reluctant attitude to waterbirth by obstetricians and many midwives. My experience is that waterbirth is excellent for pain relief in labour and birth, if it is the mother's choice.

Midwife 12
I feel that no-one is really bothered about waterbirths in my hospital. No midwives take an interest in the pool and no-one is allocated to promote its use.

Midwife 14
The pool in the unit is underused and not promoted.

Midwife 15
Waterbirth from labour ward point of view has a culture of 'I don't do waterbirths'.

Midwife 16

It is my opinion that waterbirths are seen by midwives as 'too much work' because a midwife cannot care for more than one woman whilst she is having a waterbirth (in hospital) and midwives feel waterbirths are not straightforward. Having seen many waterbirths at home in the woman's own environment I have experienced that waterbirths are the 'easiest' of all births with minimal input needed by the midwife. I believe that waterbirths should be encouraged more.

Midwife 18
My last experience was 2 years ago supporting my friend who just wanted to use the pool for pain relief but ended feeling too relaxed to get out for the birth. Another was a vaginal breech delivery.

Midwife 21
More chance of having one if you have a home birth. In hospital more chance of there not being a midwife available to look after woman in pool.

Midwife 23
When the pool is occupied for the majority of the time as midwives we can campaign for additional facilities (pool no 2,…3…?)!! While it often sits unused I feel we could be doing a better job of promoting it A/N and offering it to woman who have not thought about it when they are admitted to labour ward.

In the community you always need to stress to women that the pool may not be available to avoid disappointment – this may have a neg affect on women in removing it from their preference list…… so this could be an argument for more availability (pool no 2….3….)!

Midwife 24
I have only positive experiences with waterbirths both at home and in hospital. This hospital is not proactive with waterbirths.

Midwife 25
Many women are denied the choice of a waterbirth due to staffing levels.

Midwife 28
I love them! My understanding is that most of my local hospital only offer waterbirths to women who fit the 'low-risk' criteria. Women are not necessarily offered it as a form of pain management (with the option of getting out of the pool for birth if they wish – though they'd likely stay put!). Having just one pool in hospital also, I feel, is a sign of their lack of choice for women. Hospitals should have two pools.

Midwife 30
On labour ward there are plans to install a birth pool to support VBAC.
It depends on management attitudes as to whether waterbirths are promoted.

Appendix 27: Q Methodology: Correlation Matrix Between Sorts

SORTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1 Mid1	100	55	51	54	48	60	48	60	56	53	56	65	56	47	47	60	62	57	66	51	64	52	63	73	41	47	67	60	54	71	46
2 Mid2	55	100	40	59	66	57	45	64	68	81	52	71	53	55	65	80	74	81	56	38	78	74	71	81	59	45	76	69	77	59	44
3 Mid3	51	40	100	52	49	71	43	31	48	41	28	35	31	56	49	44	48	49	42	40	37	40	61	44	47	37	56	38	54	46	23
4 Mid4	54	59	52	100	51	67	55	57	49	63	52	54	46	51	59	51	64	63	56	59	58	65	62	69	41	49	63	47	57	66	39
5 Mid5	48	66	49	51	100	71	45	49	64	69	45	69	58	59	69	63	79	62	62	32	56	55	73	72	53	35	69	77	63	49	48
6 Mid6	60	57	71	67	71	100	43	51	81	67	57	65	45	65	78	60	82	63	64	52	60	59	74	68	47	46	72	62	71	53	44
7 Mid7	48	45	43	55	45	43	100	41	45	54	39	47	41	40	36	27	44	52	57	36	48	54	54	49	44	45	61	45	49	49	39
8 Mid8	60	64	31	57	49	51	41	100	53	68	52	64	35	63	53	64	63	70	61	47	68	65	62	76	47	73	63	63	60	70	24
9 Mid9	56	68	48	49	64	81	45	53	100	72	54	63	45	68	72	66	76	70	60	40	66	59	69	68	46	41	70	70	76	53	48
10 Mid10	53	81	41	63	69	67	54	68	72	100	61	73	45	62	72	73	77	78	71	33	71	67	78	77	62	43	72	72	74	53	52
11 Mid11	56	52	28	52	45	57	39	52	54	61	100	69	47	41	48	61	50	60	61	56	62	57	57	71	46	43	65	53	47	61	31
12 Mid12	65	71	35	54	69	65	47	64	63	73	69	100	63	60	67	81	70	68	71	49	75	65	80	85	47	55	76	77	68	65	47
13 Mid13	56	53	31	46	58	45	41	35	45	45	47	63	100	43	49	53	52	49	57	32	56	49	56	60	38	42	55	45	33	63	39
14 Mid14	47	55	56	51	59	65	40	63	68	62	41	60	43	100	69	65	61	62	58	53	52	50	70	57	52	53	64	65	58	62	35
15 Mid15	47	65	49	59	69	78	36	53	72	72	48	67	49	69	100	73	71	66	66	48	56	63	77	63	52	41	68	69	65	43	43
16 Mid16	60	80	44	51	63	60	27	64	66	73	61	81	53	65	73	100	67	70	61	52	77	63	76	82	65	50	74	71	73	62	39
17 Mid17	62	74	48	64	79	82	44	63	76	77	50	70	52	61	71	67	100	71	72	47	71	70	71	78	52	48	72	78	74	59	54
18 Mid18	57	81	49	63	62	63	52	70	70	78	60	68	49	62	66	70	71	100	64	37	73	77	74	80	45	52	72	70	71	62	23
19 Mid19	66	56	42	56	62	64	57	61	60	71	61	71	57	58	66	61	72	64	100	45	62	61	72	76	46	55	72	65	57	58	39
20 Mid20	51	38	40	59	32	52	36	47	40	33	56	49	32	53	48	52	47	37	45	100	41	55	43	51	41	44	62	53	48	63	24
21 Mid21	64	78	37	58	56	60	48	68	66	71	62	75	56	52	56	77	71	73	62	41	100	70	68	85	54	65	71	66	72	73	41
22 Mid22	52	74	40	65	55	59	54	65	59	67	57	65	49	50	63	63	70	77	61	55	70	100	66	72	64	60	65	60	65	70	24
23 Mid23	63	71	61	62	73	74	54	62	69	78	57	80	56	70	77	76	71	74	72	43	68	66	100	79	57	56	70	69	71	61	47
24 Mid24	73	81	44	69	72	68	49	76	68	77	71	85	60	57	63	82	78	80	76	51	85	72	79	100	50	62	83	73	77	75	36
25 Mid25	41	59	47	41	53	47	44	47	46	62	46	47	38	52	52	65	52	45	46	41	54	64	57	50	100	38	59	46	61	54	41
26 Mid26	47	45	37	49	35	46	45	73	41	43	43	55	42	53	41	50	48	52	55	44	65	60	56	62	38	100	49	39	46	74	09
27 Mid27	67	76	56	63	69	72	61	63	70	72	65	76	55	64	68	74	72	72	72	62	71	65	70	83	59	49	100	68	72	66	40
28 Mid28	60	69	38	47	77	62	45	63	70	72	53	77	45	65	69	71	78	70	65	53	66	60	69	73	46	39	68	100	73	57	46
29 Mid29	54	77	54	57	63	71	49	60	76	74	47	68	33	58	65	73	74	71	57	48	72	65	71	77	61	46	72	73	100	57	42
30 Mid30	71	59	46	66	49	53	49	70	53	53	61	65	63	62	43	62	59	62	58	63	73	70	61	75	54	74	66	57	57	100	24
31 Mid31	46	44	23	39	48	44	39	24	48	52	31	47	39	35	43	39	54	23	39	24	41	24	47	36	41	9	40	46	42	24	100

Appendix 28: Factor Arrays for the four Viewpoints

(Scores in **bold** indicate a significant statement for that Factor)

Num	Statement	Factor Arrays			
		1 (n=11)	**2** (n=5)	**3** (n=2)	**4** (n = 2)
1	I think conducting a waterbirth is more difficult than a traditional birth.	**-3**	-2	-1	-1
2	I feel competent to conduct waterbirths.	**4**	**4**	-2	**4**
3	The waterbirth service is seen as low priority because services offered by doctors are given more prestige.	1	-1	0	2
4	It is safe for women to stay in water for the third stage of labour.	1	-1	0	**3**
5	I am anxious in case a baby aspirates water.	0	-2	-1	-2
6	I feel stressed when working with women having a waterbirth because there is less technology involved.	**-4**	**-3**	-1	**-4**
7	I think providing a waterbirth service is too expensive because of the cost of the birthing pool and other equipment.	-2	-2	**-3**	-2
8	Enthusiastic leadership is important to support the waterbirth service.	2	**3**	1	**4**
9	My lack of confidence in conducting waterbirths means that I don't offer them to women.	**-3**	**-3**	2	**3**
10	I think all suitable women should be offered a waterbirth.	**3**	**4**	2	**3**
11	I think mothers have a more positive birth experience with a waterbirth.	**4**	1	3	0
12	I have had a bad experience during a waterbirth so don't offer this option any more.	**-3**	**-4**	**-3**	1
13	Warm water provides good pain relief during the birth process.	**3**	2	**4**	**3**
14	I would like more formal training in waterbirths.	-1	**3**	**3**	**-4**
15	Conducting waterbirths increases my job satisfaction.	**3**	0	1	0
16	I find waterbirths a dirty, messy business.	-2	-1	-2	**-3**
17	I think women who use the pool have a greater chance of a normal birth.	**3**	0	**3**	1
18	Waterbirths must be offered by maternity units to enhance the service they provide to women.	2	1	**3**	2
19	It is difficult to gain waterbirth skills because there are not many midwives who are willing, or able, to support other midwives.	0	1	0	0
20	Women having a waterbirth have a shorter labour.	1	0	0	1
21	I am anxious about hurting my back when conducting waterbirths.	0	-1	1	-1
22	I think babies born in water are more alert at birth.	1	0	1	2
23	To provide a waterbirth service a maternity unit needs to increase the number of midwives.	0	0	-1	-1
24	I would recommend a waterbirth to a family member or friend.	1	1	2	0
25	It is difficult to maintain the water at the correct temperature during a waterbirth.	-1	**-3**	-2	1
26	Risk assessment is important to prevent litigation.	0	3	0	0

27	Waterbirths should not be conducted in a busy obstetric labour ward.	-2	**-3**	**-3**	0
28	There is insufficient evidence-based information about waterbirths to discuss the risks and benefits with women.	**-3**	0	**-3**	-1
29	I enjoy waterbirths because I am using all my midwifery skills.	2	1	0	0
30	I think there is an increased risk of litigation if anything goes wrong.	-1	-1	-2	-2
31	Waterbirths are a part of the normal practice of a midwife.	2	2	2	2
32	I prefer to offer women a more medicalised birth.	**-4**	**-4**	-2	**-3**
33	For safety reasons, I think there should be two midwives present at a waterbirth.	-1	**3**	-1	-2
34	I feel that being able to conduct waterbirths is an additional tool in my kit box to enable me to support women through childbirth.	0	2	1	1
35	When conducting a waterbirth I feel out of my comfort zone.	-2	-2	1	**-4**
36	A waterbirth is a cost-effective method of coping with pain during childbirth.	1	1	**4**	2
37	I worry about the risk of infection for a baby during a waterbirth.	-2	-1	**-4**	-3
38	A waterbirth is wonderful for a baby, from water into water, no bright lights, it is such a peaceful birth.	2	2	2	-1
39	I would be more willing to conduct waterbirths if I thought midwifery managers were supportive of them.	0	0	0	-1
40	I worry about having to get women out of a pool in an emergency.	-1	2	-1	1
41	I am anxious because the baby is born blue and takes a long time to breathe.	-1	-2	**-4**	-2